

A Revisional Study of the Japanese Spiders of the Genus *Cyclosa* MENGE (Araneae: Araneidae)

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分類学的研究

Abstract Japanese spiders of the genus *Cyclosa* MENGE, 1866, are revised. After an examination of many specimens collected from various parts of Japan, 22 species of the genus occurring in the country were recognized. They are as follows: *C. octotuberculata* KARSCH, 1879, *C. laticauda* BÖSENBERG et STRAND, 1906, *C. monticola* BÖSENBERG et STRAND, 1906, *C. angusta* sp. nov., *C. onoi* sp. nov., *C. omonaga* sp. nov., *C. confusa* BÖSENBERG et STRAND, 1906, *C. japonica* BÖSENBERG et STRAND, 1906, *C. norihisai* sp. nov., *C. atrata* BÖSENBERG et STRAND, 1906, *C. hamulata* sp. nov., *C. maritima* sp. nov., *C. psylla* (THORELL, 1887), *C. mulmeinensis* (THORELL, 1887), *C. vallata* KEYSERLING, 1886, *C. sachikoe* sp. nov., *C. alba* sp. nov., *C. argenteoalba* BÖSENBERG et STRAND, 1906, *C. okumae* sp. nov., *C. ginnaga* YAGINUMA, 1959, *C. kumadai* sp. nov. and *C. sedeculata* BÖSENBERG et STRAND, 1906.

The first araneologist who studied Japanese spiders of the genus *Cyclosa* was KARSCH (1979). He described two new species, *C. octotuberculata* and *C. sedeculata*. The second report was made by BÖSENBERG and STRAND (1906). They described six new species, *C. argenteoalba*, *C. atrata*, *C. confusa*, *C. japonica*, *C. laticauda* and *C. monticola*, and two species new to the Japanese fauna, *C. insulana* (COSTA, 1834) and *C. vallata* (KEYSERLING, 1886). S. SAITO (1939) added *C. conica* (PALLAS, 1772). PAIK (1942) described one new species, *C. bifurcata*, but it was synonymized with *Cyrtophora exanthematica* (DOLESCHALL, 1859) by YAGINUMA (1958). YAGINUMA (1959) described one new species, *C. ginnaga*. He (1967) recorded *C. mulmeinensis* (THORELL, 1887) from Japan. YAGINUMA and SHINKAI (1975) reported *C. litoralis* (L. KOCH, 1867) from this country. Afterward, it was changed to *C. camelodes* (THORELL, 1878) (SHINKAI, 1977). BÖSENBERG and STRAND (1906) reported *Araneus psyllus* (THORELL, 1887) from Japan. YAGINUMA (1977) transferred it from *Araneus* to *Cyclosa*. Thus, 15 species of the genus have been known to the Japanese fauna (YAGINUMA *et al.*, 1990). Of these, *C. psylla*, *C. confusa* and *C. conica*, have never been recognized, since they were reported from Japan.

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Accepted June 24, 1992

Of 15 known species mentioned above, the following ones are problematical. The spiders identified with *C. insulana* by BÖSENBERG and STRAND (1906) and many Japanese authors (S. SAITO, 1959; YAGINUMA, 1968, 1970, 1977, 1986; CHIKUNI, 1989; *et al.*) are proved to be a misidentification through a comparison of the Japanese specimens with those from Europe. The specimens identified with *C. insulana* by previous authors included two species, *C. insulana* det. BÖSENBERG and STRAND and *C. confusa* BÖSENBERG et STRAND, 1906. The male palpal organ of some specimens exactly agrees with that of the holotype of *C. confusa*, although *C. confusa* has never been recognized since its original description. In fact, the spiders common in southwest Japan were identified wrongly with *C. insulana*. It is revealed that the species regarded as *C. camelodes* by SHINKAI (1977) and YAGINUMA (1977, 1986) is not the true *C. camelodes* but a new species, on the basis of a comparison with the type specimen. I could not examine any specimen of *C. conica* collected from Japan. This species was reported from the country by S. SAITO (1939), but his specimen was probably lost. Accordingly, the species is ignored in this paper.

Consequently, twelve known species confirmed to occur in Japan will be redescribed in this paper and ten new species will be described under the names, *C. angusta*, *C. onoi*, *C. omonaga*, *C. norihisai*, *C. hamulata*, *C. maritima*, *C. sachikoae*, *C. alba*, *C. okumae* and *C. kumadai*.

All the type specimens designated in this paper are deposited in the collection of National Science Museum (Nat. Hist.), Tokyo.

The abbreviations used in this paper (with the exception of those used in the explanation of figures) are as follows: AME, anterior median eye; ALE, anterior lateral eye; L, length; MOA, median ocular area; PME, posterior median eye; PLE, posterior lateral eye; W, width.

Genus *Cyclosa* MENGE, 1866

Cyclosa MENGE, 1866, Schr. naturf. Ges. Danzig, (n. F.), 1: 73. Type species *Aranea conica* PALLAS, 1772. — SIMON, 1929, Arachn. Fr., 6: 708. — WIEHLE, 1931, Tierw. Deutschl., 6: 13, 18. — YAGINUMA, 1968, Spid. Japan Col., (enl. rev. ed.), p. 67; 1986, *ibid.* (n. ed.), p. 119. — LEVI, 1977, Bull. Mus. comp. Zool., 148: 73. — TIKADER, 1982, Fauna India, 2: 183.

Parazygia DI CAPORIACCO, 1955, Acta biol. Venezuel., 1: 345. Type species *Parazygia accentonotata* DI CAPORIACCO, 1955 [= *Cyclosa caroli* (HENTZ, 1850)].

Further literatures see BONNET (1956).

Diagnosis. *Cyclosa* can be separated from other genera of the family Araneidae, especially from *Araneus* s. lat., by narrow head region, distinct and U-shaped cervical groove and closely situated PMEs. *Larinia* species also have closely situated PMEs, but the shape and coloration of the abdomen of the genus are quite different from those of *Cyclosa*. The patellae of the male palps in *Cyclosa* species have only one macroseta, but those of *Araneus* and *Larinia* species have two macrosetae.

Female. Cephalothorax longer than wide, convex, cervical groove distinct and U-shaped. Both rows of eyes recurved, MOA wider in front than behind, PMEs almost adjoining (except *sedeculata*).

Male. Cephalothorax longer than wide; head region narrow (except *sedeculata*), projecting forward; cervical groove indistinct. Both rows of eyes recurved; MOA wider in front than behind; PME's almost adjoining (except *sedeculata*). Palpal patella with one macroseta. First coxa with small hook.

Remarks. Under this genus, about 120 species were described from all over the world (ROEWER, 1942; BONNET, 1958, BRIGNOLI, 1983; PLATNICK, 1989). Including new species described in the present paper, 22 species occur in Japan.

Key to the Japanese Species

1. Female 2.
- Male 25.
2. PME's separated by more than one diameter (PME-PME/PME 1.00–1.50); abdomen with four protuberances at the posterior end, but without dorsal tubercles on the anterior half (Figs. 258–259); epigynum as in Fig. 260 *C. sedeculata* KARSCH, 1879.
- PME's closely situated; abdomen and epigynum otherwise 3.
3. Abdomen globular or oval, as long as wide or slightly longer than wide, caudally not pointed (Figs. 146–147, 149, 151–154, 166, 168–171) .. 4.
- Abdomen otherwise 6.
4. Abdomen oval, without dorsal tubercle (Figs. 146–147); epigynum with C-shaped sclerotized lobe (Fig. 148) *C. psylla* (THORELL, 1887).
- Abdomen globular, often with a pair of dorsal tubercles (Figs. 149, 151–154, 166, 168–171); epigynum otherwise) Figs. 159–161, 174–176) ... 5.
5. Spermathecae strongly curved in dorsal view (Fig. 177) *C. vallata* (KEYSERLING, 1886).
- Spermathecae not so strongly curved in dorsal view (Fig. 162) *C. mulmeinensis* (THORELL, 1887).
6. Abdomen dorsally with eight protuberances (Figs. 1, 10) *C. octotuberculata* KARSCH, 1879.
- Abdomen otherwise 7.
7. Abdomen slender, with a pair of distinct lateral humps at about 1/4 or 1/3 from the posterior end and with a ventral tubercle between lateral humps and posterior end, posterior end vertically bifurcated (sometimes indistinct) (Figs. 109–111, 119–121) 8.
- Abdomen otherwise 9.
8. Epigynum rather wide; spermathecae rather elongated (Fig. 125) *C. hamulata* sp. nov.
- Epigynum rather narrow; spermathecae rather rounded (Fig. 118) *C. atrata* BÖSENBERG et STRAND, 1906.
9. Anterior part of abdomen with a pair of dorsal tubercles (Figs. 12, 14, 26, 36, 40, 136–137, 183, 199) 10.
- Abdomen without paired dorsal tubercles on anterior half 17.
10. Posterior end of abdomen with four protuberances (Figs. 12, 14, 35–36, 39–40) 11.
- Posterior end of abdomen otherwise 13.

11. 2nd leg longer than 4th leg (4th leg/2nd leg 0.90–0.94); abdomen anteriorly rather thick, and steeply become narrower behind spinnerets (Figs. 12, 14); or slim, somewhat elongated and gradually become narrower behind spinnerets (Figs. 35–36) 12.
- 2nd leg nearly as long as 4th leg (4th leg/2nd leg 0.99–1.01); abdomen otherwise (Figs. 39–40) *C. onoi* sp. nov. (part.).
12. Abdomen anteriorly rather thick and steeply become narrower behind spinnerets (Figs. 12, 14) *C. laticauda* BÖSENBERG et STRAND, 1906.
- Abdomen slim, somewhat elongated and gradually become narrower behind spinnerets (Figs. 35–36) *C. angusta* sp. nov.
13. Posterior end of abdomen with three protuberances (Figs. 23–24, 26–27) 14.
- Posterior end of abdomen otherwise (Figs. 131, 136–137, 182–183, 198–199) 15.
14. 2nd leg longer than 4th leg (4th leg/2nd leg 0.92–0.94); abdomen somewhat elongated (Figs. 23–24, 26–27) *C. monticola* BÖSENBERG et STRAND, 1906 (part.).
- 2nd leg nearly as long as 4th leg (4th leg/2nd leg 0.99–1.01); abdomen not so elongated (Figs. 39–40) *C. onoi* sp. nov. (part.).
15. Epigynum often without scape (Fig. 141), if exist, scape nearly as long as wide or slightly longer than wide (Figs. 138–140); posterior end of abdomen rather rounded (Figs. 131, 136–137) ... *C. maritima* sp. nov.
- Epigynum always with scape; scape distinctly longer than wide (Figs. 184, 200); posterior end of abdomen sharp (Figs. 182–183, 198–199) ... 16.
16. Carapace dark brown, eye area often lighter; dorsum of abdomen with complicated dark coloured markings (Fig. 182) .. *C. sachikoe* sp. nov.
- Carapace pale yellow; markings on dorsum of abdomen not so complicated (Fig. 198) *C. alba* sp. nov.
17. Posterior end of abdomen with three tubercles (Figs. 23–24, 26–27, 44–46, 65–67, 71–73, 99–100) 18.
- Posterior end of abdomen without lateral tubercles (Figs. 81–82, 92–96, 211–213, 222, 247–248), or with a pair of indistinct lateral tubercles at about 1/4–1/3 from the posterior end (Figs. 232–234) 21.
18. Venter of abdomen with a pair of distinct tubercles between epigynum and spinnerets (Figs. 26–27); dorsum of abdomen without silver coloured markings (Figs. 23–24) *C. monticola* BÖSENBERG et STRAND, 1906 (part.).
- Venter of abdomen without tubercle, even if exist, almost indiscernible; dorsum of abdomen often with silver coloured markings (Figs. 44–46, 65–67, 99–100) 19.
19. 2nd leg nearly as long as 4th leg, or slightly longer than 4th leg (4th leg/2nd leg 0.96–0.99); collected from Ogasawara Islands *C. norihisai* sp. nov.
- 2nd leg as long as 4th leg or slightly shorter than 4th leg (4th leg/2nd leg 1.00–1.06); collected from other region 20.
20. Carapace rather wide (L/W 1.17–1.26); scape of epigynum slender and not so wrinkled (Fig. 68) *C. confusa* BÖSENBERG et STRAND, 1906.
- Carapace rather long (L/W 1.32–1.38); scape of epigynum wide and much

- wrinkled (Figs. 47–48) *C. omonaga* sp. nov.
21. Dorsum of abdomen with complicated markings; X-shaped or transverse silver marking often distinct (Figs. 81–82); shape of epigynum as in Figs. 83–85 *C. japonica* BÖSENBERG et STRAND, 1906.
- Dorsum of abdomen silver with several black markings, or almost black (Figs. 211–213, 222, 232–234, 247–248); epigynum otherwise (Figs. 215–216, 223–225, 238–240, 250–252) 22.
22. Scape of epigynum as wide as epigynum (Fig. 215); in the case of without scape, shape of the epigynum as in Fig. 216 *C. argenteoalba* BÖSENBERG et STRAND, 1906.
- Scape of epigynum narrower than epigynum (Figs. 223, 238, 250); shape of epigynum otherwise (Figs. 225, 240, 252) 23.
23. Epigynum with double structured scape (Figs. 250–251); in the case of without scape, shape of the epigynum as in Fig. 252 .. *C. kumadai* sp. nov.
- Scape of epigynum single (Figs. 223–224, 238–239; it looks like double structured in *C. okumae*); in the case of without scape, shape of epigynum otherwise 24.
24. Scape of epigynum evidently single (Figs. 238–239); in the case of without scape, shape of the epigynum as in Fig. 240 *C. ginnaga* YAGINUMA, 1959.
- Scape of epigynum looks like double structured (Figs. 223–224); in the case of without scape, shape of the epigynum as in Fig. 225 *C. okumae* sp. nov.
25. PME's separated by more than one diameter (PME–PME/PME 1.00–1.43); head region stout (Fig. 262) *C. sedeculata* KARSCH, 1879.
- PME's closely situated; head region narrow, projecting forward 26.
26. Abdomen dorsally with eight protuberances (Fig. 2) *C. octotuberculata* KARSCH, 1879.
- Abdomen otherwise 27.
27. Embolus filiform, wrapped in an edge of conductor (Figs. 133, 163, 178, 188) 28.
- Embolus rostriform or spiniform, not wrapped (Figs. 18, 32, 54, 76, 79, 90, 107, 113, 127, 220, 228, 245, 255) 31.
28. Median apophysis with two small teeth, at distal part and at about the middle (Fig. 188) *C. sachikoe* sp. nov.
- Median apophysis otherwise 29.
29. Large triangular appendix of median apophysis not folded over (Figs. 163, 165) *C. mulmeinensis* (THORELL, 1887).
- Large appendix of median apophysis folded over (Figs. 133, 178) 30.
30. Cymbium distally pointed (Fig. 179); abdomen caudally obtuse (Figs. 172–173) *C. vallata* (KEYSERLING, 1886).
- Cymbium distally obtuse (Fig. 134); abdomen caudally often pointed (Fig. 132) *C. maritima* sp. nov.
31. Embolus rostriform (Figs. 18, 32) 32.
- Embolus spiniform (Figs. 54, 76, 79, 90, 107, 113, 127, 220, 228, 245, 255) 33.
32. Paramedian apophysis visible in prolateral view (Fig. 18); tibia of 2nd leg slightly warped in dorsal view (Fig. 21)

- *C. laticauda* BÖSENBERG et STRAND, 1906.
- Paramedian apophysis almost hidden by the basal lamella of median apophysis in prolateral view (Fig. 32); tibia of 2nd leg almost straight in dorsal view (Fig. 34) *C. monticola* BÖSENBERG et STRAND, 1906.
33. Median apophysis large and V-shaped (Fig. 230) *C. okumae* sp. nov.
- Median apophysis otherwise 34.
34. Median apophysis distally bifurcated (Figs. 77–78, 89, 105, 242, 254) .. 35.
- Median apophysis distally not bifurcated (Figs. 53, 115, 129, 218, 243) 39.
35. Cymbium caudally projecting in dorsal view (Fig. 244) *C. ginnaga* YAGINUMA, 1959 (part.).
- Cymbium otherwise 36.
36. Distal part of median apophysis slightly curved (Fig. 254) *C. kumadai* sp. nov.
- Median apophysis distally bent over (Figs. 77–78, 89, 105) 37.
37. Distal part of median apophysis small (Fig. 105); the first femur without a row of short spines *C. norihisai* sp. nov.
- Distal part of median apophysis large (Figs. 77–78, 89), retrolateral side of the first femur distally with a row of short spines 38.
38. Conductor rather roundish in prolateral view (Figs. 76, 79); palpal organ smaller than following species .. *C. confusa* BÖSENBERG et STRAND, 1906.
- Conductor rather elongated in prolateral view (Fig. 90); palpal organ larger than preceding species *C. japonica* BÖSENBERG et STRAND, 1906.
39. Cymbium caudally projecting in dorsal view (Figs. 219, 244) 40.
- Cymbium otherwise 41.
40. Median apophysis distally flattened and truncated (Fig. 218); terminal apophysis almost indiscernible (Figs. 220–221) *C. argenteoalba* BÖSENBERG et STRAND, 1906.
- Median apophysis distally bent and pointed (Fig. 243); terminal apophysis distinct (Figs. 245–246) *C. ginnaga* YAGINUMA, 1959 (part.).
41. Median apophysis distally hook-shaped (Fig. 129) .. *C. hamulata* sp. nov.
- Median apophysis distally bent, flattened, and truncated (Figs. 53, 115) 42.
42. Paramedian apophysis large (Fig. 113); basal lamella of median apophysis round (Fig. 113); abdomen almost black (Fig. 112) *C. atrata* BÖSENBERG et STRAND, 1906.
- Paramedian apophysis small and invisible in prolateral view; basal lamella of median apophysis digitiform (Fig. 54); abdomen silvery pale brown, mottled with dark brown and silver (Fig. 52) *C. omonaga* sp. nov.

***Cyclosa octotuberculata* KARSCH, 1879**

[Japanese name: Gomigumo]

(Figs. 1–11)

Cyclosa octotuberculata KARSCH, 1879, Verh. naturf. Ver. preuss. Rheinl. Westfalens, **36**: 74, pl. 1, fig. 8. — BÖSENBERG & STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 208, pl. 15, fig. 412. — S. SAITO, 1939, Saito Ho-on Kai Mus. Bull., **18**: 12, fig. 2; 1959, Spid.

Book Illustr. Col., p. 111, figs. 6, 21, pl. 14, fig. 111, pl. 16, fig. 111. — ROEWER, 1942, Kat. Aran., 1: 753. — BONNET, 1956, Bibl. Aran., 2: 1320. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 67, pl. 30, fig. 167; 1970, Bull. natn. Sci. Mus., Tokyo, 13: 659; 1977, Acta arachnol., 27 (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 119, fig. 63, pl. 33, fig. 1. — ZHU, 1983, J. Bethune med. Univ., 9 (spec. no.): 29. — PAIK & KIM, 1985, Korean Arachnol., 1: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 334. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 84, 218, fig. 67. — KIM, 1991, Korean Arachnol., 6: 282.

Specimens examined. 2♀♀, Shirakawano-seki-ato, Shirakawa-shi, Fukushima Pref., 24-VI-1990, A. TANIKAWA leg.; 1♀1♂, Univ. of Tsukuba, Tsukubashi, Ibaragi Pref., 6-VI-1976, A. TANIKAWA leg. (NSMT-Ar 2307); 2♀♀2♂♂, 19-V-1991, 1♀, 14-VII-1991, Kinchakuden, Hidaka-chô, Saitama Pref., A. TANIKAWA leg.; 1♀, Katsuragi, Chiba-shi, Chiba Pref., 12-VI-1984, T. KAWANA leg. (NSMT-Ar 838); 3♀♀, Okutama, Nishitama-gun, Tokyo, 25-V-1980, A. TANIKAWA leg.; 1♀1♂, Nozuda, Machida-shi, Tokyo, 10-VI-1990, A. TANIKAWA leg.; 2♀♀, Minenoyakushi, Tsukui-gun, Kanagawa Pref., 3-VI-1990, A. TANIKAWA leg.; 1♂, Maioka-chô, Yokohama-shi, Kanagawa Pref., 23-V-1980, A. TANIKAWA leg. (NSMT-Ar 2304); 1♀, 26-V-1984, 1♂, 28-V-1990 (NSMT-Ar 2308), 3♀♀1♂, 29-V-1990 (NSMT-Ar 2305), Noba-chô, Yokohama-shi, Kanagawa Pref., A. TANIKAWA leg.; 1♀, 22-VI-1980 (NSMT-Ar 2312), 1♀, 20-V-1990 (NSMT-Ar 2311), Jinmuji, Zushi-shi, Kanagawa Pref., A. TANIKAWA leg.; 2♀♀, same locality, 22-VI-1980, H. IJIMA leg. (NSMT-Ar 2313); 3♀♀, Iyama, Atsugi-shi, Kanagawa Pref., 27-V-1990, A. TANIKAWA leg. (NSMT-Ar 2309); 1♀, Nanasawa, Atsugi-shi, Kanagawa Pref., 17-VI-1984, N. TANAKA leg.; 1♀, Manazuru, Ashigarashimo-gun, Kanagawa Pref., 22-VIII-1990, A. TANIKAWA leg.; 1♂, Mt. Ôgiyama, Ôtsuki-shi, Yamanashi Pref., 25-V-1986, A. TANIKAWA leg. (NSMT-Ar 2306); 1♀, Kisofukushima, Kiso-gun, Nagano Pref., 6-VII-1972, H. TANAKA leg.; 1♀, Ogisukeikoku, Suzuka-shi, Mie Pref., 13-VIII-1981, A. UYEMURA leg. (NSMT-Ar 2310); 2♂♂, Ashiu, Kitakuwata-gun, Kyoto Pref., 9-VI-1969, H. TANAKA leg.; 1♀, Shimokamo, Kyoto-shi, Kyoto Pref., 7-VI-1969, H. TANAKA leg.; 1♂, Syukunoshô, Ibaraki-shi, Osaka Pref., 25-V-1978, T. KAMURA leg.; 1♂, Segawa, Minô-shi, Osaka Pref., 21-V-1977, T. KAMURA leg.; 3♂♂, Mozuume-machi, Sakai-shi, Osaka Pref., 16-V-1981, H. TANAKA leg.; 2♀♀, Univ. Osaka Pref., Sakai-shi, Osaka Pref., 2-VI-1966, H. TANAKA leg.; 1♀, Yoshino, Yoshino-gun, Nara Pref., 4-VIII-1984, H. TANAKA leg.; 1♀, Mihama-chô, Hidaka-gun, Wakayama Pref., 29-VIII-1990, A. TANIKAWA leg.; 1♀, Susami-chô, Nishimuro-gun, Wakayama Pref., 29-VIII-1990, A. TANIKAWA leg.; 1♀, 2-VIII-1991, 2♀♀, 4-VIII-1991, Nachikatsuura-chô, Higashimuro-gun, Wakayama Pref., A. TANIKAWA leg.; 1♀1♂, 25-V-1969, 1♂, 13-V-1966, Hikami-chô, Hikami-gun, Hyogo Pref., H. TANAKA leg.; 1♀, Higashitaichi, Tamano-shi, Okayama Pref., 26-VIII-1991, A. TANIKAWA leg.; 1♀, Mihonoseki-chô, Yatsuka-gun, Shimane Pref., 2-IX-1991, K. KUMADA leg.; 2♂♂, Mimido, Kamiukena-gun, Ehime Pref., 24-V-1967, C. OKUMA leg.; 1♀1♂, Takahama, Matsuyama-shi, Ehime Pref., 25-V-1970, H. TANAKA leg.; 1♀1♂, Tsushima Island, Nagasaki Pref., 22-V-1978, C. OKUMA leg.; 2♀♀, Hisayama-chô, Kasuya-gun, Fukuoka Pref., 24-VIII-1991, A. TANIKAWA leg.; 2♀♀, 3~8-VIII-1951, 1♀1♂, 5~9-VI-1958, 1♀, 3-VIII-1963, Mt. Hikosan, Tagawa-gun, Fukuoka Pref., C. OKUMA leg.; 2♀♀2♂♂, Mt. Sangunsan, Fukuoka Pref., 10-

VI-1951, C. OKUMA leg.; 1♀, Nakakuma, Fukuoka-shi, Fukuoka Pref., 1-V-1951, C. OKUMA leg.; 1♀, Kokubu, Kurume-shi, Fukuoka Pref., 26-V-1962, S. IDE leg.; 1♀, Takachihokyô, Nishiusuki-gun, Miyazaki Pref., 24-VII-1960, C. OKUMA leg.; 3♀♀, Mt. Eboshi-dake, Aira-gun, Kagoshima Pref., 1-VI-1971, H. TANAKA leg.; 2♀♀, Ishiki-chô, Kagoshima-shi, Kagoshima Pref., 28-V-1971, H. TANAKA leg.; 1♀2♂♂, Shiroyama, Kagoshima-shi, Kagoshima Pref., 17-V-1973, H. TANAKA leg.; 1♂, Sata, Kimotsuki-gun, Kagoshima Pref., 27-V-1952, ESAKI & HIRASHIMA leg.

Description. Measurement (in mm). Body length ♀ 10.60–14.40, ♂ 7.85–10.06; carapace length ♀ 3.68–4.65, ♂ 3.58–4.20, width ♀ 2.88–3.55, ♂ 2.62–3.13; abdomen length ♀ 6.40–9.25, ♂ 4.30–5.80, width ♀ 3.87–5.55, ♂ 2.28–3.33. Lengths of legs of 1♀1♂ from Kanagawa Pref. as shown in Table 1.

Table 1. Measurement of leg segments of *Cyclosa octotuberculata* KARSCH, 1879 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	1.08/1.04	2.60/2.58	2.80/2.92	1.76/1.56	3.84/3.64	12.08/11.74
II	0.94/0.90	2.22/2.22	2.40/2.44	1.66/1.44	3.36/3.28	10.58/10.28
III	0.78/0.72	1.32/1.32	1.36/1.46	1.18/0.92	2.28/2.28	6.92/ 6.70
IV	0.86/0.84	2.20/2.34	2.28/2.42	1.52/1.30	3.40/3.26	10.26/10.16

Female. Carapace length/width 1.27–1.31, MOA length/width 0.91–0.96, anterior width/posterior width 1.38–1.75. Chelicera with 3–4 promarginal and 3 retromarginal teeth. Labium length/width 0.64–0.75, sternum length/width 1.21–1.29. Length of leg 1/carapace 2.72–2.92. Retrolateral side of 1st femur distally with a row of short spines. Abdomen length/width 1.66–1.80; anteriorly with a pair of dosal tubercles, posteriorly with six protuberances (Figs. 1, 10), ventrally with a pair of tubercles between epigynum and spinnerets (Fig. 10). Female genitalia (Figs. 3–4): scape of epigynum slender and wrinkled (Fig. 3), internal genitalia as shown in Fig. 4.

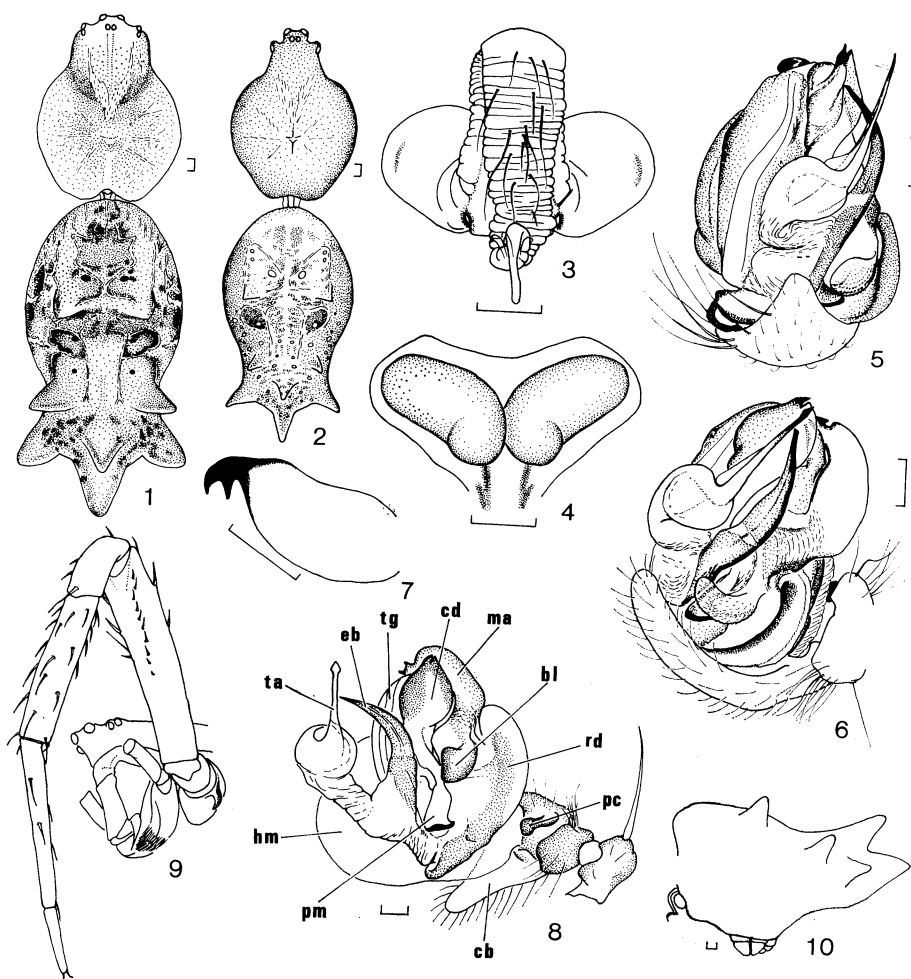
Male. Carapace length/width 1.34–1.38; MOA length/width 0.83–0.98, anterior width/posterior width 1.55–2.00. Chelicera with 2–4 promarginal and 3 retromarginal teeth. Labium length/width 0.72–0.78; sternum length/width 1.26–1.33. Length of leg 1/carapace 2.84–2.94. Retrolateral side of 1st femur distally with a row of short spines (Fig. 9). Male palp (Figs. 5–8): median apophysis distally bent and bifurcated (Fig. 7), basally with a wing-shaped lamella (Fig. 6); embolus rostriform (Fig. 6); paramedian apophysis visible in prolateral view (Fig. 6). Abdomen length/width 1.74–2.00; on dorsum, anteriorly with a pair of tubercles and posteriorly with six protuberances (Fig. 2); on venter, with a pair of tubercles before spinnerets (often indistinct).

Coloration and markings. Female. Carapace dark brown mottled with pale brown, with V-shaped light coloured marking between eye area and median fovea, provided with white pubescence on the V-shaped marking and along radial furrow (Fig. 1). Abdomen brown to dark brown, mottled with paler and darker brown and white lines, with a pair of black patch between anterior pair of tubercles and posterior protuberances (Fig. 1).

Male. Carapace dark brown, sometimes with V-shaped light coloured marking as in female (Fig. 2). Abdomen similar to female, but darker (Fig. 2).

Range. Japan, China, Korea.

Remarks. This species can be easily distinguished from the other Japanese species of *Cyclosa* by the shape of abdomen.



Figs. 1-10. *Cyclosa octotuberculata* KARSCH, 1879. — 1. Cephalothorax and abdomen of female, dorsal view. 2. Cephalothorax and abdomen of male, dorsal view. 3. Epigynum. 4. Female genitalia, dorsal view. 5. Male palp, axial view. 6. Same, prolateral view. 7. Median apophysis of male palp (distal part). 8. Male palp, expanded. 9. 1st leg of male. 10. Female abdomen, lateral view. (Scales: 0.25 mm.) Abbreviations: bl, basal lamella of median apophysis; cb, cymbium; cd, conductor; eb, embolus; hm, hematodocha; ma, median apophysis; pc, paracymbium; pm, paramedian apophysis; rd, radix; ta, terminal apophysis; tg, tegulum.

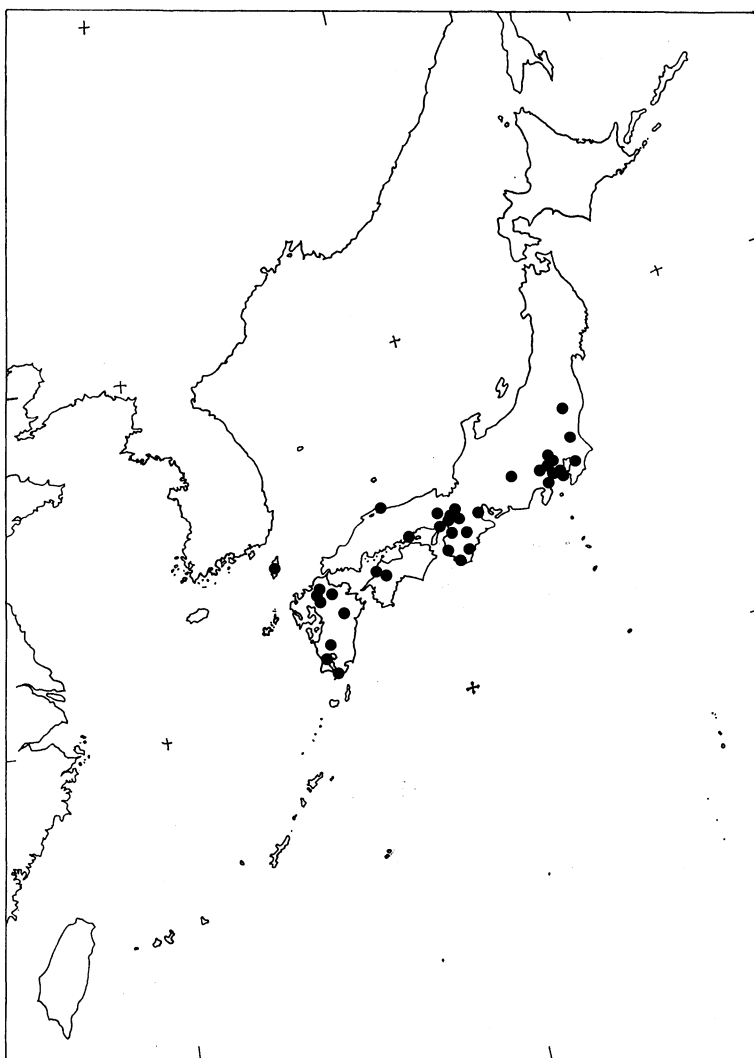


Fig. 11. Distribution of *Cyclosa octotuberculata* KARSCH, 1879, in Japan, based on the specimens examined in this study.

***Cyclosa laticauda* BÖSENBERG et STRAND, 1906**

[Japanese name: Kijiro-gomigumo]

(Figs. 12–22)

Cyclosa laticauda BÖSENBERG et STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 209. pl. 15, fig. 414. — S. SAITO, 1939, Saito Ho-on Kai Mus. Bull., **18**: 12, fig. 2.; 1959, Spid. Book Illustr. Col., p. 98, pl. 14, fig. 110, pl. 16, fig. 110. — ROEWER, 1942, Kat.

Aran., 1: 753. — BONNET, 1956, Bibl. Aran., 2: 1319. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 67, pl. 30, fig. 165; 1970, Bull. natn. Sci. Mus., Tokyo, 13: 658; 1977, Acta arachnol., 27 (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 119, fig. 63, pl. 33, fig. 3. — ZHU, 1983, J. Bethune med. Univ., 9 (spec. no.): 29. — PAIK & KIM, 1985, Korean Arachnol., 1: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 87, 220, fig. 77. (part.: female). — KIM, 1991, Korean Arachnol., 6: 282.

Specimens examined. Type series. Syntypes: 1♀1 juv., Kompira, Saga, 1883, W. DÖNITZ leg. (SMF 3653).

Other specimens examined. 1♀, Oshidomari, Rishiritô Island, Hokkaido, 13–VII–1990, K. KUMADA leg. (NSMT–Ar 2314); 1♀, Nakatonbetsu, Esashigun, Hokkaido, 17–VII–1990, K. KUMADA leg.; 1♀, Yagishiritô Island, Hokkaido, 3–IX–1981, K. KUMADA leg. (NSMT–Ar 2315); 1♂, Tobishima Island, Sakata-shi, Yamagata Pref., 12–VII–1968, K. SASAKI leg.; 2♀♀, Toyoshina-chô, Minami-azumi-gun, Nagano Pref., 7–VII–1974, Y. CHIKUNI leg.; 1♀, Shionogitôge, Hinode-chô, Tokyo, 26–V–1990, K. KUMADA leg. (NSMT–Ar 2318); 1♂, Kimitsu-shi, Chiba Pref., 28–IV–1990, A. SHINKAI leg. (NSMT–Ar 2317); 2♂♂, Mt. Kiyosumiyama, Chiba Pref., 27–V–1990, A. SHINKAI leg. (NSMT–Ar 2316); 1♀, Jinmuji, Zushi-shi, Kanagawa Pref., 21–VI–1981, A. TANIKAWA leg. (NSMT–Ar 2319); 1♀, Fudakake, Tanzawa, Kanagawa Pref., 12–VIII–1972, K. KUMADA leg. (NSMT–Ar 2320); 2♀♀, Ôsugidani, Taki-gun, Mie Pref., 12–14–VI–1971, H. TANAKA leg.; 1♀, Ashiu, Kitakuwata-gun, Kyoto Pref., 27–V–1979, T. KAMURA leg.; 1♀, Hirogawara, Kyoto-shi, Kyoto Pref., 28–V–1979, T. KAMURA leg.; 1♀, Kajigamori, Kochi Pref., 18–VII–1965, K. NAKAHIRA leg. (NSMT–Ar 243); 1♀, 4–9–VIII–1958, 1♀, 27–31–V–1959, 2♀♀, 27–VII–2–VIII–1959, Mt. Hikosan, Tagawa-gun, Fukuoka Pref., C. OKUMA leg.; 1♂, Mt. Yuwan-dake, Amami-ôshima Island, Kagoshima Pref., 24–VIII–1989, M. SADAMOTO leg. (NSMT–Ar 2321).

Description. Measurement (in mm). Body length ♀ 6.03–10.00, ♂ 3.88–5.13; carapace length ♀ 1.86–3.30, ♂ 2.23–2.40, width ♀ 1.37–2.32, ♂ 1.60–1.75; abdomen length ♀ 4.05–7.30, ♂ 1.75–2.86, width ♀ 2.25–3.60, ♂ 1.22–1.67. Length of lges of the syntype 1♀ and 1♂ from Chiba Pref. as shown in Table 2.

Table 2. Measurement of leg segments of *Cyclosa laticauda* Bös. et STR., 1906 (in mm; ♀/♂).

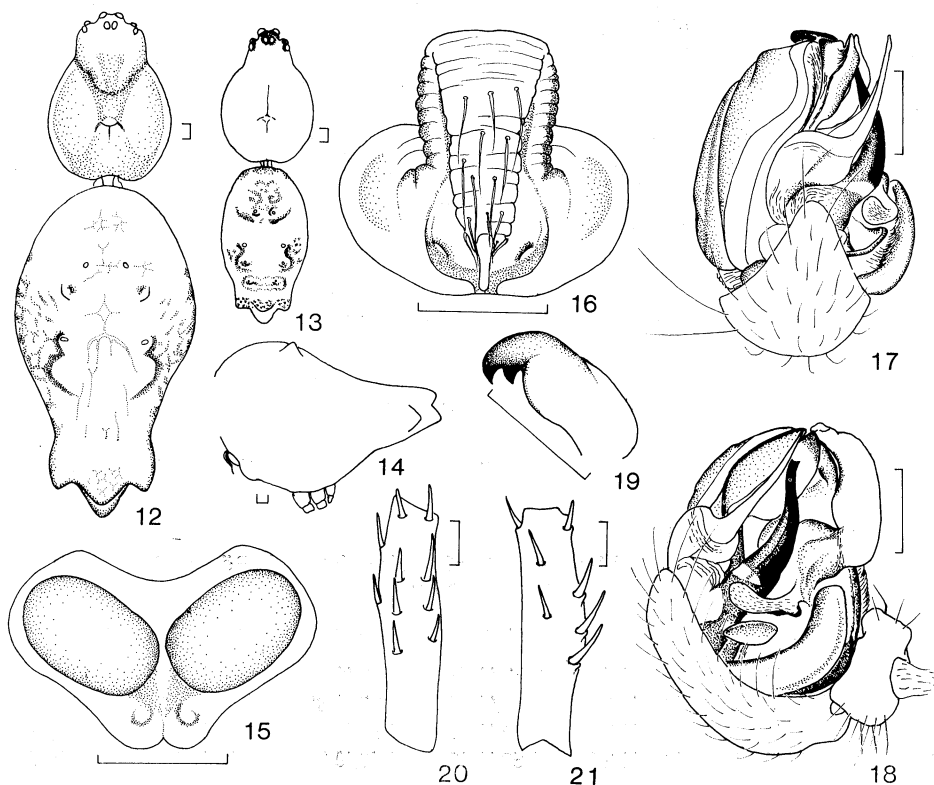
Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.78/0.64	2.02/1.45	2.27/1.63	1.37/0.91	3.00/2.25	9.44/6.88
II	0.73/0.59	1.73/1.28	1.83/1.31	1.27/0.88	2.58/1.98	8.14/6.04
III	0.62/0.50	1.00/0.75	1.02/0.76	0.82/0.55	1.83/1.40	5.29/3.96
IV	0.67/0.54	1.72/1.26	1.68/1.18	1.07/0.73	2.53/1.83	7.67/5.54

Female. Carapace length/width 1.30–1.38; MOA length/width 0.87–0.96, anterior width/posterior width 1.25–1.43. Chelicera with 3–4 teeth on both margin. Labium length/width 0.65–0.78; sternum length/width 1.19–1.28. Length of leg 1/carapace 2.97–3.23. Abdomen length/width 1.80–2.08; anteriorly with a pair of dorsal tubercles, posteriorly with four protuberances (Figs.

12, 14), ventrally with a pair of tubercles between epigynum and spinnerets (Fig. 14). Female genitalia (Figs. 15–16): scape of epigynum slender and wrinkled (Fig. 16), internal genitalia as shown in Fig. 15.

Male. Carapace length/width 1.37–1.40; MOA length/width 0.81–0.85, anterior width/posterior width 1.55–1.75. Chelicera with 3–4 teeth on both margin. Labium length/width 0.48–0.70; sternum length/width 1.34–1.41. Length of leg 1/carapace 2.81–2.99. Retrolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 17–19): median apophysis distally bent and bifurcated (Fig. 19), basally with a wing-shaped lamella (Fig. 18); embolus rostriform (Fig. 18); paramedian apophysis visible in prolateral view (Fig. 18). Abdomen length/width 1.43–1.86; on dorsum, anteriorly with a pair of tubercles and posteriorly with four protuberances (Fig. 13); on venter, with a pair of tubercles before spinnerets (sometimes indistinct).

Coloration and markings. Female. Carapace pale brown, cervical groove and posterior part of thoracic region darker (Fig. 12). Abdomen yellowish



Figs. 12–21. *Cyclosa laticauda* BÖSENBURG et STRAND, 1906. — 12. Cephalothorax and abdomen of female, dorsal view. 13. Cephalothorax and abdomen of male, dorsal view. 14. Female abdomen, lateral view. 15. Female genitalia, dorsal view. 16. Epigynum. 17. Male palp, axial view. 18. Same, prolateral view. 19. Median apophysis of male palp (distal part). 20. Tibia of male 2nd leg, prolateral view. 21. Same, dorsal view. (Scales: 0.25 mm.)

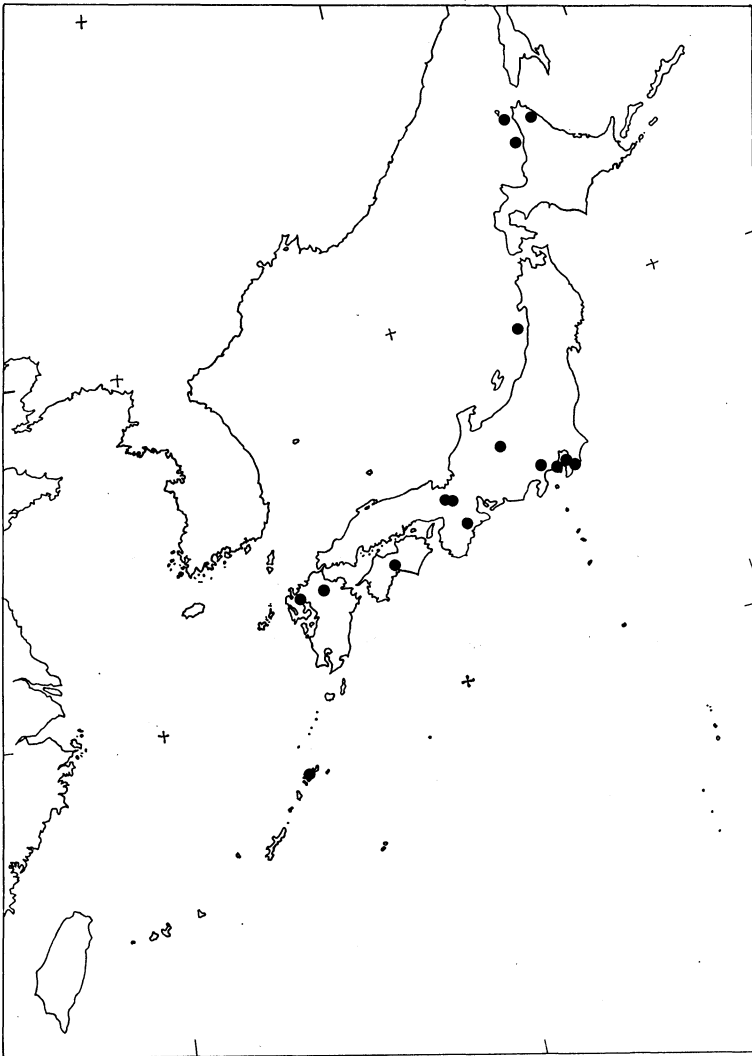


Fig. 22. Distribution of *Cyclosa laticauda* BÖSENBERG et STRAND, 1906, in Japan, based on the specimens examined in this study.

brown, with a pair of 3-shaped dark coloured markings (Fig. 12).

Male. Carapace brown to dark brown, anteriorly and laterally paler. Abdomen similar to female (Fig. 13), but often darker.

Range. Japan, Korea, Taiwan.

Remarks. This species resembles *C. monticola* BÖSENBERG et STRAND, 1906, *C. angusta* sp. nov. and *C. onoi* sp. nov. It can be distinguished from *C. monticola* by the following points. Female: posterior end of abdomen is

vertically bifurcated (Fig. 14), not as in *C. monticola* (Figs. 26–27); the abdomen is thicker (Figs. 12, 14) than that of *C. monticola* (Figs. 23–24, 26–27), especially obvious in lateral view (Figs. 14, 26–27). Male: palpal paramedian apophysis is visible in prolateral view (Fig. 18), but that of *C. monticola* is almost hidden by the basal lamella of median apophysis (Fig. 32); in prolateral view, the conductor is more roundish (Fig. 18) than that of *C. monticola* (Fig. 32); the tips of distal end of median apophysis are closely situated (Fig. 19), but those of *C. monticola* are more apart (Fig. 30); in dorsal view, the tibia of 2nd leg is slightly warped (Fig. 21), but it is almost straight in *C. monticola* (Fig. 34); spiniformations of prolateral side of 2nd tibiae of both the species are also different from each other, though these are varied (Figs. 20, 33). As for the distinction from *C. angusta* and *C. onoi*, see the remarks of them.

***Cyclosa monticola* BÖSENBERG et STRAND, 1906**

[Japanese name: Yama-gomigumo]

(Figs. 23–34, 43)

Cyclosa monticola BÖSENBERG et STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 210, pl. 15, fig. 413. — ROEWER, 1942, Kat. Aran., **1**: 753. — BONNET, 1956, Bibl. Aran., **2**: 1319. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 67, pl. 30, fig. 164; 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 658; 1977, Acta arachnol., **27** (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 119, fig. 63, pl. 33, fig. 4. — ZHU, 1983, J. Bethune med. Univ., **9** (spec. no.): 29. — PAIK & KIM, 1985, Korean Arachnol., **1**: 63. PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 87, 220, fig. 78. — KIM, 1991, Korean Arachnol., **6**: 282.

Cyclosa laticauda: CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 87, 220, fig. 77. (part.: male) [nec *C. laticauda* BÖSENBERG et STRAND, 1906].

Specimens examined. Type series. Holotype: ♀, “Yunohama Berge”, Saga, 1882, W. DÖNITZ leg. (SMF 3655).

Other specimens examined. 1 ♀, Utsunuki-chô, Hachiôji-shi, Tokyo, 23–V–1984, K. KUMADA leg. (NSMT–Ar 2322); 1 ♀, 28–VI–1981, 1 ♀, 26–V–1991, Mt. Tsukui-shiroyama, Tsukui-gun, Kanagawa Pref., A. TANIKAWA leg. (NSMT–Ar 2323); 1 ♀, Maioka-chô, Yokohama-shi, Kanagawa Pref., 9–V–1990, K. KUMADA leg. (NSMT–Ar 2325); 1 ♂, Noba-chô, Yokohama-shi, Kanagawa Pref., 9–V–1983, A. TANIKAWA leg. (NSMT–Ar 2324); 1 ♀ 1 ♂, Fudakake, Tanzawa, Kanagawa Pref., 12–VIII–1972, K. KUMADA leg. (NSMT–Ar 2326); 1 ♀, Ôkura, Tanzawa, Kanagawa Pref., 17–V–1987, A. TANIKAWA leg. (NSMT–Ar 2327); 1.80; abdomen length ♀ 4.85–6.47, ♂ 2.71–3.24, width ♀ 2.10–2.87, ♂ 1.44–1.80; Yoshidaguchi, Fujiyoshida-shi, Yamanashi Pref., 19–VI–1977, K. KUMADA leg. (NSMT–Ar 2329); 1 ♀, Mt. Hira-san, Shiga-gun, Shiga Pref., 3–VIII–1955, T. YAGINUMA leg. (NSMT–Ar 321); 1 ♂, Haino, Kitakuwata-gun, Kyoto Pref., 8–VI–1969, H. TANAKA leg.; 1 ♀, Kibune, Kyoto-shi, Kyoto Pref., 20–IX–1969, H. TANAKA leg.; 1 ♂, Tsushima Island, Nagasaki Pref., 22–V–1978, C. OKUMA leg.

Description. Measurement (in mm). Body length ♀ 7.20–8.95, ♂ 5.07–5.73; carapace length ♀ 2.51–2.93, ♂ 2.38–2.51, width ♀ 1.83–2.07, ♂ 1.73–

1.80; abdomen length ♀ 4.85–6.47, ♂ 2.71–3.24, width ♀ 2.10–2.87, ♂ 1.44–1.76. Length of legs of the holotype ♀ and 1 ♂ from Kanagawa Pref. as shown in Table 3.

Table 3. Measurement of leg segments of *Cyclosa monticola* Bös. et STR., 1906 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.73/0.65	1.63/1.36	1.79/1.55	1.15/0.88	2.36/1.95	7.66/6.39
II	0.65/0.58	1.44/1.17	1.55/1.30	1.09/0.85	2.10/1.75	6.83/5.65
III	0.53/0.46	0.76/0.67	0.85/0.74	0.71/0.58	1.36/1.21	4.21/3.66
IV	0.61/0.54	1.34/1.13	1.40/1.18	0.90/0.68	2.04/1.67	6.29/5.20

Female. Carapace length/width 1.38–1.44; MOA length/width 0.78–0.94, anterior width/posterior width 1.50–1.70. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width 0.59–0.70, sternum length/width 1.28–1.32. Length of leg 1/carapace 2.74–2.93. Abdomen length/width 2.15–2.31; anteriorly sometimes with a pair of dorsal tubercles, posteriorly with three protuberances (Figs. 23–24, 26–27), ventrally, with a pair of tubercles between epigynum and spinnerets (Figs. 26–27). Female genitalia (Figs. 28–29): scape of epigynum slender and wrinkled (Fig. 28); internal genitalia as shown in Fig. 29.

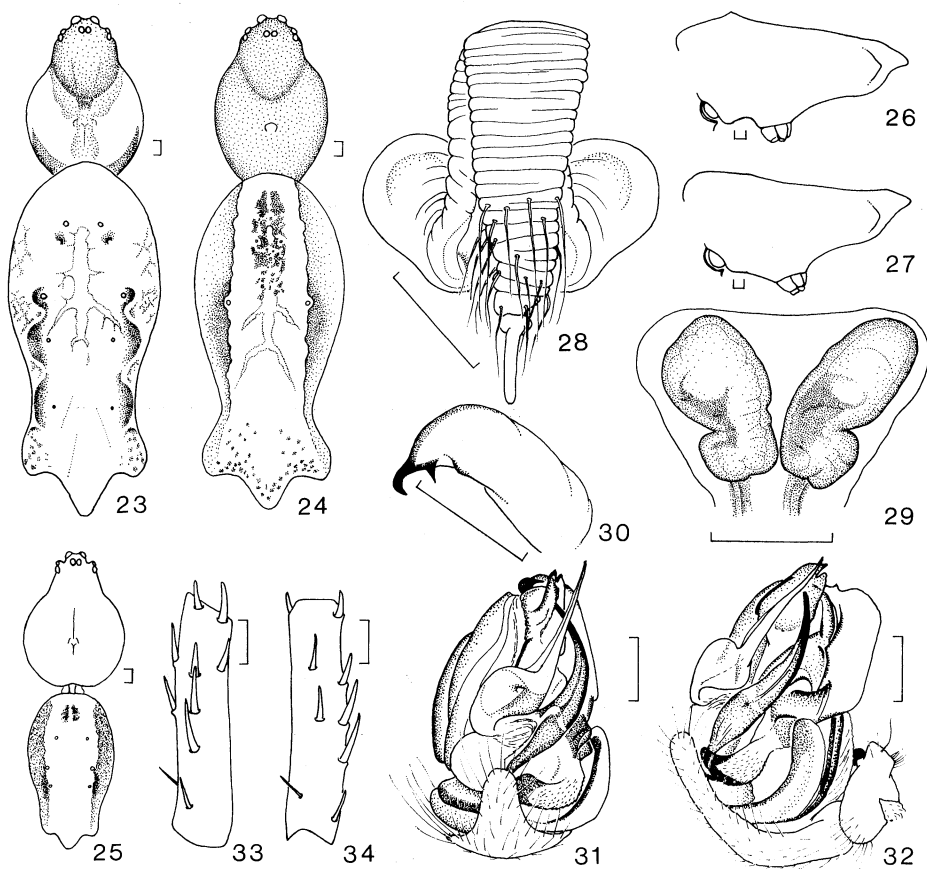
Male. Carapace length/width 1.35–1.40; MOA length/width 0.80–0.87, anterior width/posterior width 1.61–1.77. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width 0.65–0.71; sternum length/width 1.23–1.27. Length of leg 1/carapace 2.62–2.76. Retrolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 30–32): median apophysis distally bent and bifurcated (Fig. 30), basally with a wing-shaped lamella (Fig. 32); embolus rostriform (Fig. 32); paramedian apophysis almost hidden in prolateral view (Fig. 32). Abdomen length/width 1.76–1.92; posteriorly with three protuberances (Fig. 25); on venter, with a pair of tubercles before spinnerets.

Coloration and markings. Female. Somewhat varied. Carapace pale brown, cervical groove and posterior part of thoracic region darker; dark brown, both sides of median fovea paler (Fig. 23); or uniformly dark brown (Fig. 24). Abdomen yellowish brown, with a pair of waving dark coloured markings (Fig. 23); or reddish brown, with wide whitish yellow median band mottled with black (Fig. 24).

Male. Carapace brown, sometimes with darker markings. Abdomen similar to the female in colour (Fig. 25).

Range. Japan, China, Korea, Taiwan.

Remarks. This species resembles *C. laticauda* BÖSENBERG et STRAND, 1906 and *C. angusta* sp. nov. As for the discrimination, see the remarks of these species.



Figs. 23–34. *Cyclosa monticola* BÖSONG et STRAND, 1906. — 23–24. Cephalothorax and abdomen of female, dorsal view. 25. Cephalothorax and abdomen of male, dorsal view. 26–27. Female abdomen, lateral view. 28. Epigynum. 29. Female genitalia, dorsal view. 30. Median apophysis of male (distal part). 31. Male palpus, axial view. 32. Same, prolateral view. 33. Tibia of male 2nd leg, prolateral view. 34. Same, dorsal view. (Scales: 0.25 mm.)

***Cyclosa angusta* sp. nov.**

[Japanese name: Yase-gomigumo]

(Figs. 35–38, 43)

Specimen examined. Type series. Holotype: ♀, Ôtomi, Iriomotejima Island, Okinawa Pref., 30–IV–1990, A. TANIKAWA leg. (NSMT–Ar 2330).

Description. Measurement (in mm). Body length ♀ 8.20; carapace length ♀ 2.38, width ♀ 1.65; abdomen length ♀ 5.73, width ♀ 2.37. Length of legs of the holotype ♀ as shown in Table 4.

Table 4. Measurement of leg segments of *Cyclosa angusta* sp. nov. (in mm; ♀).

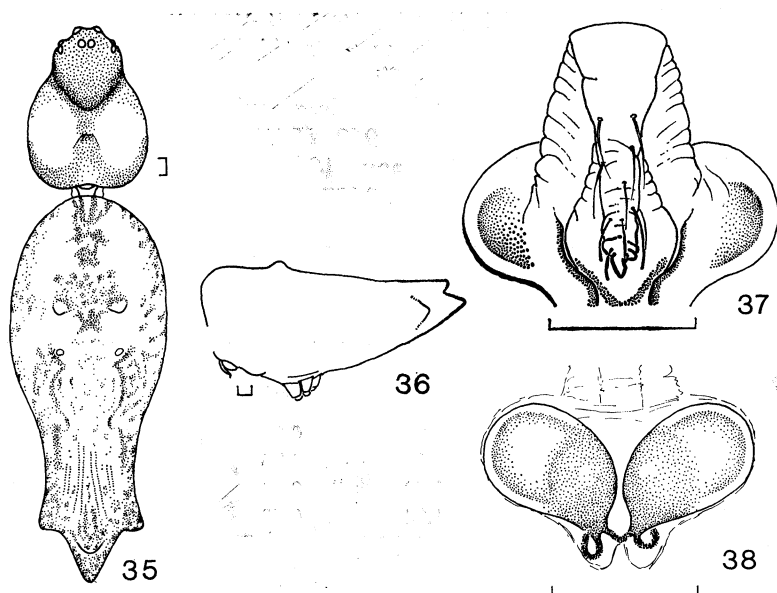
Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.64	1.44	1.58	1.00	2.09	6.75
II	0.60	1.22	1.31	0.96	1.82	5.91
III	0.49	0.71	0.72	0.64	1.24	3.80
IV	0.53	1.24	1.21	0.81	1.78	5.57

Female. Carapace length/width 1.44; MOA length/width 0.90, anterior width/posterior width 1.37. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width 0.68; sternum length/width 1.33. Length of leg 1/carapace 2.84. Abdomen length/width 2.42; anteriorly with a pair of dorsal tubercles, posteriorly with four protuberances (Figs. 35–36), ventrally with a pair of small tubercles between epigynum and spinnerets (Fig. 36). Female genitalia (Figs. 37–38): scape of epigynum slender (Fig. 37); internal genitalia as shown in Fig. 38.

Coloration and markings. Female. Carapace dark brown, both sides of median fovea yellow. Abdomen reddish brown mottled with dark brown and whitish yellow.

Male unknown.

Range. Japan (known only from the type locality).



Figs. 35–38. *Cyclosa angusta* sp. nov. — 35. Cephalothorax and abdomen of female, dorsal view. 36. Female abdomen, lateral view. 37. Epigynum. 38. Female genitalia, dorsal view. (Scales: 0.25 mm.)

Remarks. This species resembles *C. laticauda* BÖSENBERG et STRAND, 1906, but can be distinguished from the latter by the following points: abdomen is slim, somewhat elongated and gradually become narrower behind spinnerets (Figs. 35–36), while in *C. laticauda*, it is anteriorly thicker and steeply become narrower behind spinnerets (Figs. 12, 14). This species also resembles *C. monticola* BÖSENBERG et STRAND, 1906, but can be distinguished from the latter by the following points: the posterior end of the abdomen in *C. angusta* is vertically bifurcated (Fig. 36), not as in *C. monticola* (Figs. 26–27); scape of epigynum is more slender than that of *C. monticola* (Figs. 28, 37); spermathecae are without constriction (Fig. 38), but those of *C. monticola* are clearly constricted (Fig. 29).

Etymology. The specific name is due to the shape of abdomen.

***Cyclosa onoi* sp. nov.**

[Japanese name: Ono-gomigumo]

(Figs. 39–43)

Specimens examined. Type series. Holotype: ♀, Izunuma, Tome-gun, Miyagi Pref., 1–VI–1986, A. TANIKAWA leg. (NSMT–Ar 2331). Paratypes: 1 ♀, Yamagata Pref., 10–VI–1972, K. SASAKI leg. (NSMT–Ar 2332); 1 ♀, Tanashi-shi, Tokyo, 27–IX–1991, T. MIYASHITA leg. (NSMT–Ar 2336); 1 ♀, Ōkura, Tanzawa, Kanagawa Pref., 26–VI–1975, K. KUMADA leg. (NSMT–Ar 2333); 1 ♀, Toyoshina-chō, Minamiazumi-gun, Nagano Pref., 7–VII–1975, Y. CHIKUNI leg. (NSMT–Ar 2334); 1 ♀, Suizenjikōen, Kumamoto-shi, Kumamoto Pref., 19–VIII–1978, A. TANIKAWA leg. (NSMT–Ar 2335).

Specimens examined for comparison. *Cyclosa oculata* (WALCKENAER, 1802): 1 ♀, near Pula, Istria, Yugoslavia, 28–VI–1962, H. W. LEVI leg. (MCZ); 16 juv., Eltersdorf, Erlangen, Sandgrube, Germany, 18–V–1932, TRETZEL leg. (SMF 22309); 1 ♀, Odenwald, Germany (SMF 3657).

Description. Measurement (in mm). Body length ♀ 6.13–6.90; carapace length ♀ 2.02–2.35, width ♀ 1.47–1.63; abdomen length ♀ 3.92–5.03, width ♀ 2.12–2.80. Length of legs of the holotype ♀ as shown in Table 5.

Table 5. Measurement of leg segments of *Cyclosa onoi* sp. nov. (in mm; ♀).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.62	1.10	1.23	0.82	1.68	5.45
II	0.56	0.98	1.03	0.76	1.45	4.78
III	0.46	0.60	0.60	0.54	1.06	3.26
IV	0.52	1.00	1.04	0.68	1.58	4.82

Female. Carapace length/width 1.36–1.48; MOA length/width 0.92–0.98, anterior width/posterior width 1.39–1.53. Chelicera with 3 teeth on both margin. Labium length/width 0.63–0.71; sternum length/width 1.23–1.29. Length of leg 1/carapace 2.43–2.66. Abdomen length/width 1.57–1.95; anteriorly with a pair of dorsal tubercles, posteriorly with four protuberances (Figs. 39–40),

ventrally with a pair of tubercles between epigynum and spinnerets (Fig. 40). Female genitalia (Figs. 41–42): scape of epigynum slender and wrinkled (Fig. 41), internal genitalia as shown in Fig. 42.

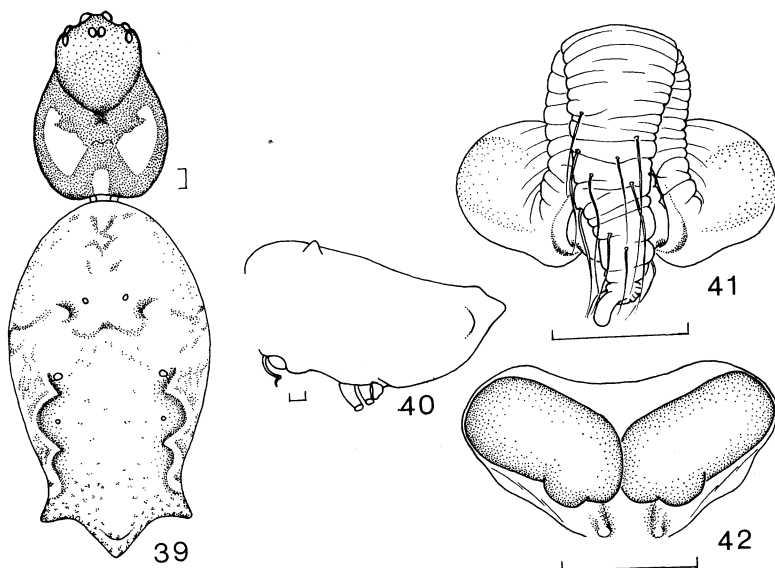
Coloration and markings. Female. Carapace dark brown, with yellow markings on both sides of median fovea and at the posterior end (Fig. 39). Abdomen pale brown mottled with dark brown and black, with a pair of waving dark coloured markings (Fig. 39).

Male unknown.

Range. Japan.

Remarks. This species resembles *C. oculata* WALCKENAER, 1802, but can be distinguished from the latter by the coloration of carapace. In this species, carapace is dark brown, with yellow markings on both sides of median fovea, but that of *C. oculata* is uniformly dark brown. This species also resembles *C. laticauda* BÖSENBERG et STRAND, 1906, but can be distinguished from the latter by the following points: abdomen is as shown in Figs. 39–40, but that of *C. laticauda* is anteriorly thicker, and steeply become narrower behind spinnerets (Figs. 12, 14); middle upper protuberance of the posterior end of abdomen is small and sometimes almost indiscernible (Fig. 40), but that of *C. laticauda* is distinct and vertical bifurcation of the posterior end of the abdomen is much more obvious (Figs. 14); 2nd leg is nearly as long as 4th leg (4th leg/2nd leg 0.99–1.01), while in *C. laticauda*, 2nd leg is longer than 4th leg (4th leg/2nd leg 0.90–0.94).

Etymology. The species is dedicated to Dr. Hirotugu ONO, National Science Museum (Nat. Hist.), Tokyo.



Figs. 39–42. *Cyclosa onoi* sp. nov. — 39. Cephalothorax and abdomen of female, dorsal view. 40. Female abdomen, lateral view. 41. Epigynum. 42. Female genitalia, dorsal view. (Scales: 0.25 mm.)

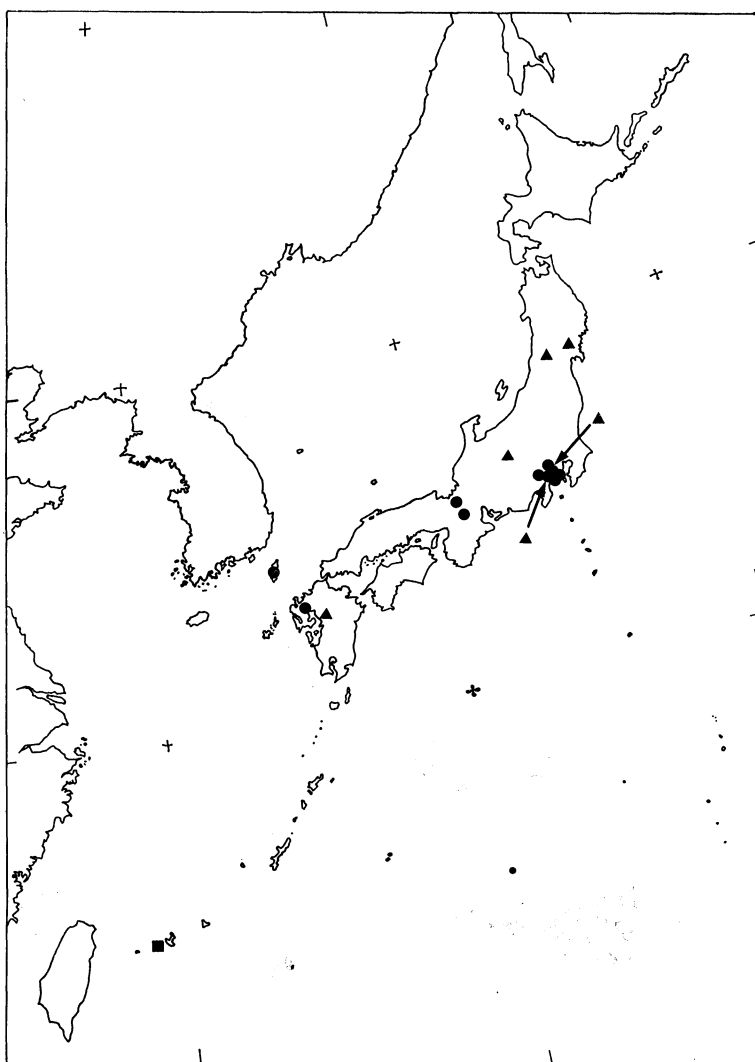


Fig. 43. Distribution of *Cyclosa monticola* BÖSENBERG et STRAND, 1906, *Cyclosa angusta* sp. nov. and *Cyclosa onoi* sp. nov. in Japan, based on the specimens examined in this study. ●: *C. monticola*; ■: *C. angusta*; ▲: *C. onoi*.

***Cyclosa omonaga* sp. nov.**

[Japanese name: Shima-gomigumo]

(Figs. 44–55, 108)

Cyclosa insulana : BÖSENBERG & STRAND, 1906., Abh. senkenb. naturf. Ges., 30: 205, pl. 4,

fig. 22, pl. 11, figs. 243–244, pl. 15, fig. 396. — S. SAITO, 1959, Spid. Book Illustr. Col., p. 99, pl. 14, fig. 113, pl. 16, fig. 113. (part.) — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 68, pl. 31, fig. 169 (part.); 1970, Bull. natn. Sci. Mus., Tokyo, 13: 658 (part.); 1977, Acta arachnol., 27 (spec. no.): 387 (part.); 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 6. (part.) — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 84, 218, fig. 68. (part.: female) [nec *C. insulana* (COSTA, 1834)].

Specimens examined. Type series. Holotype: ♂, Higashitaichi, Tamano-shi, Okayama Pref., 26–VIII–1991, A. TANIKAWA leg. (NSMT–Ar 2337). Allotype: ♀, same data as for the holotype (NSMT–Ar 2338). Paratypes: 1 ♂, Kiwa-chô, Minamimuro-gun, Mie Pref., 3–VIII–1991, A. TANIKAWA leg. (NSMT–Ar 2339); 1 ♀, 27–VIII–1990, 1 ♀ 1 ♂, 3–VIII–1991, Kumanogawa-chô, Higashimuro-gun, Wakayama Pref., A. TANIKAWA leg. (NSMT–Ar 2340–2341); 2 ♀ ♀, Okuichi, Okayama-shi, Okayama Pref., 25–VIII–1991, A. TANIKAWA leg. (NSMT–Ar 2342); 1 ♂, same data as for the holotype (NSMT–Ar 2343); 1 ♂, Tachibana-yama, Fukuoka-shi, Fukuoka Pref., 23–VIII–1991, A. TANIKAWA leg. (NSMT–Ar 2344).

Other specimens examined. 6 ♀ ♀, Totsukawa-mura, Yoshino-gun, Nara Pref., 3–VIII–1991, A. TANIKAWA leg.; 8 ♀ ♀, 30–VIII–1990, 6 ♀ ♀, 3–VIII–1991, Kiwa-chô, Minamimuro-gun, Mie Pref., A. TANIKAWA leg.; 3 ♀ ♀, Mihama-chô, Hidaka-gun, Wakayama Pref., 29–VIII–1990, A. TANIKAWA leg.; 5 ♀ ♀, 27–VIII–1990, 6 ♀ ♀, 3–VIII–1991, Kumanogawa-chô, Higashimuro-gun, Wakayama Pref., A. TANIKAWA leg.; 2 ♀ ♀, Susami-chô, Nishimuro-gun, Wakayama Pref., 29–VIII–1990, A. TANIKAWA leg.; 1 ♀, 30–VIII–1990, 2 ♀ ♀, 2–VIII–1991, Nachikatsuura-chô, Higashimuro-gun, Wakayama Pref., A. TANIKAWA leg.; 8 ♀ ♀, 2–X–1990, 7 ♀ ♀, 25–VIII–1991, Okuichi, Okayama-shi, Okayama Pref., A. TANIKAWA leg.; 1 ♀, Kamiachi, Okayama-shi, Okayama Pref., 25–VIII–1991, A. TANIKAWA leg.; 4 ♀ ♀, same data as for the holotype; 2 ♀ ♀, Kiyomizu-chô, Yasugi-shi, Shimane Pref., 2–IX–1991, K. KUMADA leg.; 4 ♀ ♀, Kokubunji-chô, Ayauta-gun, Kagawa Pref., 3–X–1990, A. TANIKAWA leg.; 1 ♀, Kanzaikawakubochô, Takamatsu-shi, Kagawa Pref., 3–X–1990, A. TANIKAWA leg.; 2 ♀ ♀, Dôgo, Matsuyama-shi, Ehime Pref., 4–X–1990, A. TANIKAWA leg.; 2 ♀ ♀, Mt. Tachibana-yama, Fukuoka-shi, Fukuoka Pref., 23–VIII–1991, A. TANIKAWA leg.; 8 ♀ ♀, “Yunohama Berge”, Saga, 1883, W. DÖNITZ leg. (SMF 3651, part., labeled *C. insulana*); 3 ♀ ♀, 4–VIII–1980, 1 ♀, 14–VIII–1990, Sakuragaoka, Yatsushiro-gun, Kumamoto Pref., S. TAZOE leg.; 2 ♀ ♀, Ishigôchi, Koyu-gun, Miyazaki Pref., 22–VII–1960, C. OKUMA leg.

Specimens examined for comparison. *Cyclosa insulana* (COSTA, 1834): 3 ♀ ♀ 3 ♂ ♂ 1 juv., Korsika, VIII–1927, WIEHLE leg. (SMF 22255; Figs. 61–62). *Cyclosa dives* SIMON, 1877: holotype ♂, Malamoy, Bassilan, Philippines, LAGLAISE leg. (MNHN, ssno B1297; Figs. 63–64). *Cyclosa albisternis* SIMON, 1888: syntypes 3 ♀ ♀ 1 ♂, Port Blair, Andaman Islands, India, M. R. D. OLDHAM leg. (MNHN, 9131 B1296; Figs. 56–60).

Description. Measurement (in mm). Body length ♀ 4.65–8.30, ♂ 3.76–4.75; carapace length ♀ 1.84–2.57, ♂ 1.85–2.25, width ♀ 1.36–1.94, ♂ 1.28–1.53; abdomen length ♀ 2.83–5.47, ♂ 1.84–2.38, width ♀ 1.66–3.13, ♂ 1.09–1.64. Length of legs of the allotype ♀ and the holotype ♂ as shown in Table 6.

Female. Carapace length/width 1.32–1.38; MOA length/width 0.88–0.95,

Table 6. Measurement of leg segments of *Cyclosa omonaga* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.67/0.53	1.54/1.13	1.67/1.27	0.92/0.63	2.27/1.69	7.07/5.25
II	0.60/0.49	1.42/0.98	1.49/1.07	0.89/0.62	2.06/1.56	6.46/4.72
III	0.52/0.40	0.88/0.60	0.84/0.66	0.58/0.42	1.42/1.11	4.24/3.19
IV	0.58/0.51	1.49/1.09	1.52/1.13	0.80/0.53	2.20/1.58	6.59/4.84

anterior width/posterior width 1.33–1.55. Chelicera with 4 promarginal and 3–4 retromarginal teeth. Labium length/width 0.67–0.74; sternum length/width 1.11–1.27. Length of leg 1/carapace 3.15–3.38. Abdomen length/width 1.68–1.89; with three protuberances at the posterior end (Figs. 44–46), often with one more tubercle at the anterior end. Female genitalia (Figs. 47–50): scape of epigynum rather wide and wrinkled (Figs. 47–48), internal genitalia as shown in Fig. 50.

Male. Carapace length/width 1.45–1.49; MOA length/width 0.83–0.91, anterior width/posterior width 1.62–1.74. Chelicera with 3–4 promarginal and 2–3 retromarginal teeth. Labium length/width 0.56–0.80; sternum length/width 1.28–1.38. Length of leg 1/carapace 2.74–2.84. Prolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 53–55): median apophysis distally bent and truncated (Fig. 53), basally with a digitiform lamella (Fig. 54); embolus spiniform (Fig. 54); paramedian apophysis almost hidden in prolateral view (Fig. 54). Abdomen length/width 1.42–1.92; caudally with three tubercles, often indistinct (Fig. 52).

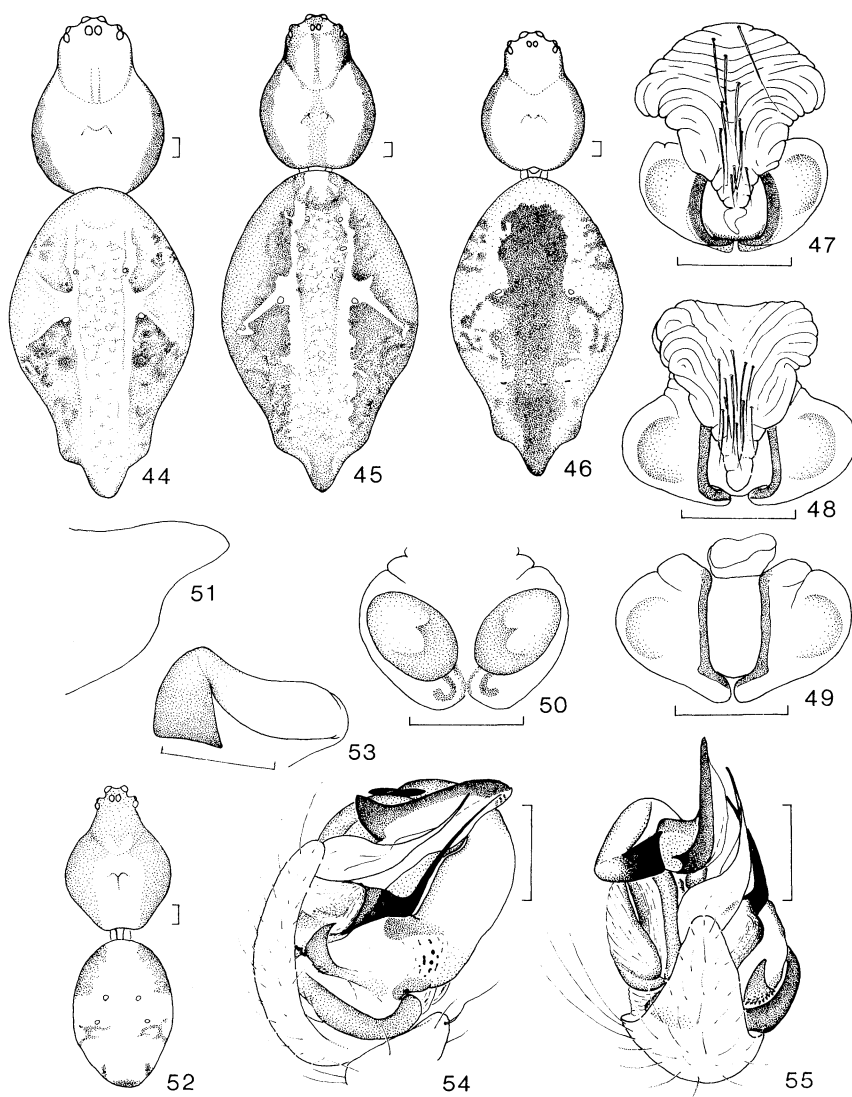
Coloration and markings. Female. Somewhat varied. Carapace pale brown, margined with dark brown (Figs. 44, 46), often with a dark brown median line (Fig. 45). Abdomen silvery pale brown, mottled with dark brown and silver, with X-shaped silver marking at about the middle (Fig. 44); lateral side of anterior half reddish brown, other part silvery pale brown mottled with dark brown and silver, with ^-shaped silver marking at about the middle (Fig. 45); or silvery pale brown with black marking (Fig. 46).

Male. Carapace pale brown, margined with dark brown. Abdomen silvery pale brown mottled with dark brown and silver (Fig. 52).

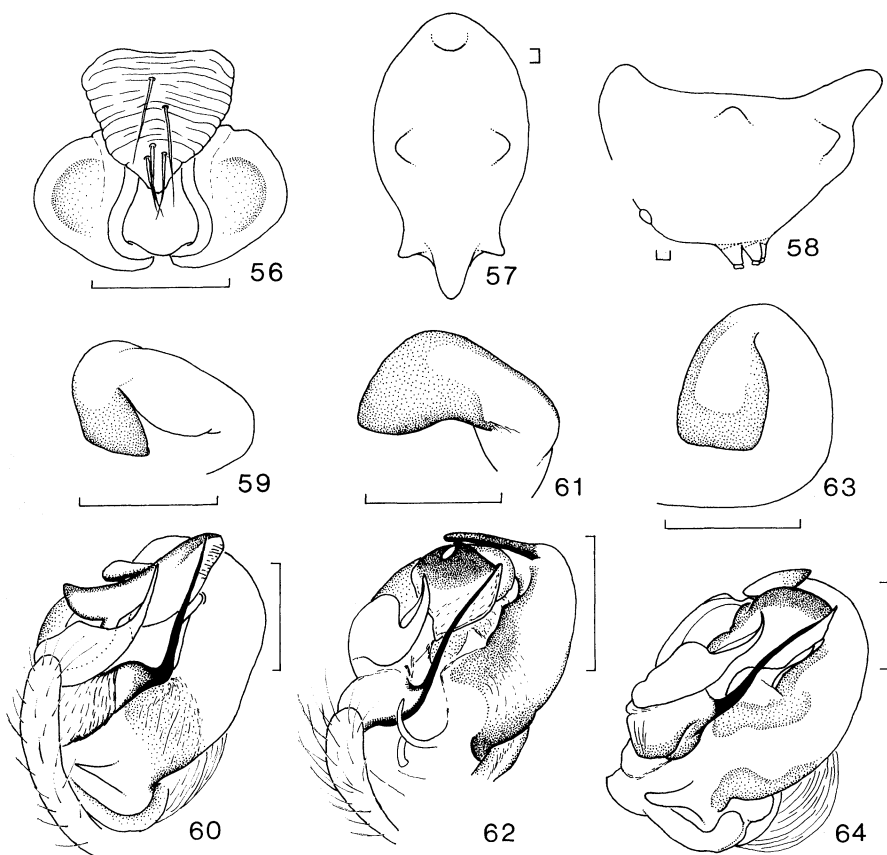
Range. Japan.

Remarks. This species closely resembles *C. albisternis* SIMON, 1888, but can be distinguished from the latter by the following points. Female: abdomen of this species is provided with three protuberances at the posterior end and without paired dorsal tubercles, but that of *C. albisternis* has three protuberances at the posterior end and a pair of dorsal tubercles at the middle (Figs. 57–58); the wrinkle pattern of epigynal scapes are also discriminative (Figs. 47–48, 56). Male: the basal lamella of palpal median apophysis is bigger than that of *C. albisternis* (Figs. 54, 60). This species also resembles *C. insulana* (COSTA, 1834), *C. dives* SIMON, 1877, *C. confusa* BÖSENBERG et STRAND, 1906 and *C. japonica* BÖSENBERG et STRAND, 1906, but can be easily distinguished from these species by the shape of median apophysis and conductor of male palp (Figs. 53–54, 61–64, 76–79, 89–90).

Etymology. The specific name is due to the shape of carapace. Japanese word "omonaga" means long-faced.



Figs. 44–55. *Cyclosa omonaga* sp. nov. — 44–46. Cephalothorax and abdomen of female, dorsal view. 47–48. Epigynum with scape. 49. Same, without scape. 50. Female genitalia, dorsal view. 51. Posterior part of female abdomen, lateral view. 52. Cephalothorax and abdomen of male, dorsal view. 53. Median apophysis of male palp (distal part). 54. Male palp, prolateral view. 55. Same, axial view. (Scales: 0.25 mm.)



Figs. 56–64. 56–60. *Cyclosa albisternis* SIMON, 1887 (syntype, MNHN, 9131 B1296). — 56. Epigynum with scape. 57. Female abdomen, dorsal view. 58. Same, lateral view. 59. Median apophysis of male palp (distal part). 60. Male palp, prolateral view. 61–62. *Cyclosa insulana* (COSTA, 1834) (SMF 22255). — 61. Median apophysis of male palp (distal part). 62. Male palp, prolateral view. 63–64. *Cyclosa dives* SIMON, 1877 (holotype, MNHN ssno B1297). — 63. Median apophysis of male palp (distal part). 64. Male palp, prolateral view. (Scales: 0.25 mm.)

Cyclosa confusa BÖSENBERG et STRAND, 1906

[Japanese name: Minaminoshima-gomigumo]

(Figs. 65–80, 98, 108)

Cyclosa confusa BÖSENBERG et STRAND, 1906, Abh. senkenb. naturf. Ges., 30: 209, pl. 15, fig. 418. — ROEWER, 1942, Kat. Aran., 1: 753. — BONNET, 1956, Bibl. Aran., 2: 1310. — YAGINUMA, 1970, Bull. natn. Sci. Mus., Tokyo, 13: 658; 1977, Acta arachnol.,

- 27 (spec. no.: 387. — ZHU, 1983, J. Bethune med. Univ., 9 (spec. no.): 28.
Cyclosa insulana: S. SAITO, 1959, Spid. Book Illustr. Col., p. 99, pl. 14, fig. 113, pl. 16, fig. 113. (part.) — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 68, pl. 31, fig. 169. (part.); 1970, Bull. natn. Sci. Mus., Tokyo, 13: 658. (part.); 1977, Acta arachnol., 27 (spec. no.): 387. (part.); 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 6. (part.) — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 84, 218, fig. 68. (part.: male) [nec *C. insulana* (COSTA, 1934)].

Specimens examined. Type series. Holotype: ♂, "Japan", 1882, W. DÖNITZ leg. (SMF 3645).

Other specimens examined. 1♀, 13-VII-1970, 1♀, 14-VII-1970, 1♀, 28-III-1985, Miyakejima Island, Tokyo, H. ONO leg.; 5♀♀, 23-IX-1982, 1♀, 28-IX-1988, Hagi, Hagi-shi, Yamaguchi Pref., A. TANIKAWA leg.; 2♀♀, "Yunohama Berge", Saga, 1883, W. DÖNITZ leg. (SMF 3651, part., labeled *C. insulana*); 7♀♀3♂♂, Okinoshima, Munakata-gun, Fukuoka Pref., 24~31-VII-1962, M. SHIGA leg.; 1♀, Wakamatsu, Kitakyushu-shi, Fukuoka Pref., 23-IX-1954, C. YOSHIDA leg.; 14♀♀, 23-VIII-1991, 5♀♀, 24-VIII-1991, Mt. Tachibanayama, Fukuoka-shi, Fukuoka Pref., A. TANIKAWA leg.; 2♀♀, Nabetani, Miyakonojō-shi, Miyazaki Pref., 19-VIII-1962, C. OKUMA leg.; 11♀♀, Aoshima, Miyazaki-shi, Miyazaki Pref., 21-VII-1960, C. OKUMA leg.; 1♀, Ebinokôgen, Ebino-shi, Miyazaki Pref., 21-VIII-1989, A. TANIKAWA leg.; 1♀, Higashiichiki-chô, Hioki-gun, Kagoshima Pref., 22-VIII-1989, A. TANIKAWA leg.; 7♀♀, Ishiki-chô, Kagoshima-shi, Kagoshima Pref., 28-V-1971, H. TANAKA leg.; 1♂, 28-VIII-1981, 1♀1♂, 22-VIII-1989, Mt. Shiroyama, Kagoshima-shi, Kagoshima Pref., A. TANIKAWA leg.; 3♀♀1♂, same locality, 22-VIII-1989, K. KUMADA leg.; 6♀♀, Ibusuki, Kagoshima Pref., 8-X-1969, C. OKUMA leg.; 4♀♀, Satamisaki, Kimotsuki-gun, Kagoshima Pref., 29-V-1971, H. TANAKA leg.; 3♀♀, 14-VII-1990, 6♀♀, 15-VII-1990, Yakushima Island, Kagoshima Pref., A. TANIKAWA leg.; 3♀♀1♂, 7-XI-1962, 2♀♀, 11-XI-1962, Amami-ôshima Island, Kagoshima Pref., C. OKUMA leg.; 1♂, same locality, 27-VIII-1989, M. SADAMOTO leg.; 5♀♀, 24-VIII-1989, 4♀♀, 27-VIII-1989, same locality, A. TANIKAWA leg.; 1♀, 31-III-1969, 2♀♀, 2-IV-1969, Tokunoshima Island, Kagoshima Pref., H. TANAKA leg.; 2♀♀, 24-III-1969, 5♀♀, 4-IV-1969, Okinoerabujima Island, Kagoshima Pref., H. TANAKA leg.; 1♀, same island, 13-III-1972, H. ONO leg.; 1♀, Okinawajima Island, Okinawa Pref., 1-II-1988, N. TANAKA leg.; 2♀♀, same island, 2-III-1990, H. ONO leg.; 4♀♀1♂, Minami-daitôjima Island, Okinawa Pref., 8~9-V-1981, C. OKUMA leg.; 1♀, Ishigakijima Island, Okinawa Pref., 23-VIII-1988, A. TANIKAWA leg.; 9♀♀, 29-III-1983, 8♀♀1♂, 30-III-1983, 3♀♀, 2-IV-1983, 1♀, 27-XII-1983, 1♀, 30-IV-1984 (NSMT-Ar 2350), 1♀, 2-V-1984, 3♀♀, 26-III-1985, 4♀♀1♂, 27-III-1985, 3♀♀, 28-III-1985, 12♀♀3♂♂, 29-III-1985 (3♂♂: NSMT-Ar 2345), 1♀1♂, 30-III-1985, 1♀1♂, 1-IV-1985, 8♀♀1♂, 1-VIII-1985, 2♀♀1♂, 11-VIII-1985, 1♀, 12-VIII-1985, 3♀♀, 13-VIII-1985, 1♀, 14-VIII-1985, 1♀, 20-VIII-1985, 4♀♀4♂♂, 28-XII-1985, 1♂, 27-XII-1985, 1♀2♂♂, 29-XII-1985 (1♂: NSMT-Ar 2346), 2♂♂, 2-I-1986, 1♂, 3-I-1986, 2♀♀1♂, 27-III-1986, 3♀♀8♂♂, 28-III-1986, 3♂♂, 29-III-1986, 1♀, 30-III-1986 (NSMT-Ar 2351), 1♂, 31-III-1986, 5♀♀, 27-XII-1986, 2♀♀1♂, 28-XII-1986, 1♀, 30-XII-1986, 1♂, 31-XII-1986, 1♀, 1-I-1987, 3♀♀, 28-III-1987, 2♀♀, 9-VIII-1987, 1♂, 24-VIII-

1987, 1♂, 27-XII-1987 (NSMT-Ar 2347), 2♂♂, 29-XII-1987, 2♂♂, 31-XII-1987, 1♀1♂, 3-I-1988 (NSMT-Ar 2352), 1♀, 28-III-1988, 1♀2♂♂, 29-III-1988, 1♀, 30-III-1988, 1♂, 1-IV-1988, 1♂, 16-VIII-1988, 2♂♂, 19-VIII-1988, 1♂, 2-I-1989, 1♀1♂, 29-III-1989, 1♂, 30-III-1989, 1♀2♂♂, 25-XII-1989, 1♀, 28-XII-1989, 1♂, 31-XII-1989 (NSMT-Ar 2348), 1♀, 2-I-1990, 1♀, 3-I-1990, 6♀♀7♂♂, 29-IV-1990 (1♂: NSMT-Ar 2349), 3♀♀1♂, 30-IV-1990 (1♀1♂: NSMT-Ar 2353), 1♀2♂♂, 1-V-1990 (1♀: NSMT-Ar 2354), 2♀♀, 2-V-1990 (1♀: NSMT-Ar 2355), 3♀♀1♂, 3-V-1990, 3♀♀, 24-XII-1990, 4♀♀2♂♂, 25-XII-1990, 1♀, 26-XII-1990, 2♀♀, 27-XII-1990, 5♀♀1♂, 29-XII-1990, 2♂♂, 31-XII-1990, 2♀♀, 1-I-1991, 3♀♀, 2-I-1991, 10♀♀3♂♂, 3-I-1991, 2♀♀, 4-I-1991, 2♀♀, 7-I-1991, 1♀, 22-VII-1991, 1♀, 25-VII-1991, 1♀, 26-VII-1991, 1♀, 30-VII-1991, Iriomotejima Island, Okinawa Pref., A. TANIKAWA leg.; 1♀, 12-VIII-1985, 4♀♀, 13-VIII-1985, 1♀, 16-VIII-1985, 1♀, 19-VIII-1985, same locality, N. TANAKA leg.; 1♀, Haterumajima Island, Okinawa Pref., 31-X-1987, N. TANAKA leg. (NSMT-Ar 2356); 1♀, Yonagunijima Island, Okinawa Pref., 2-XI-1987, N. TANAKA leg.

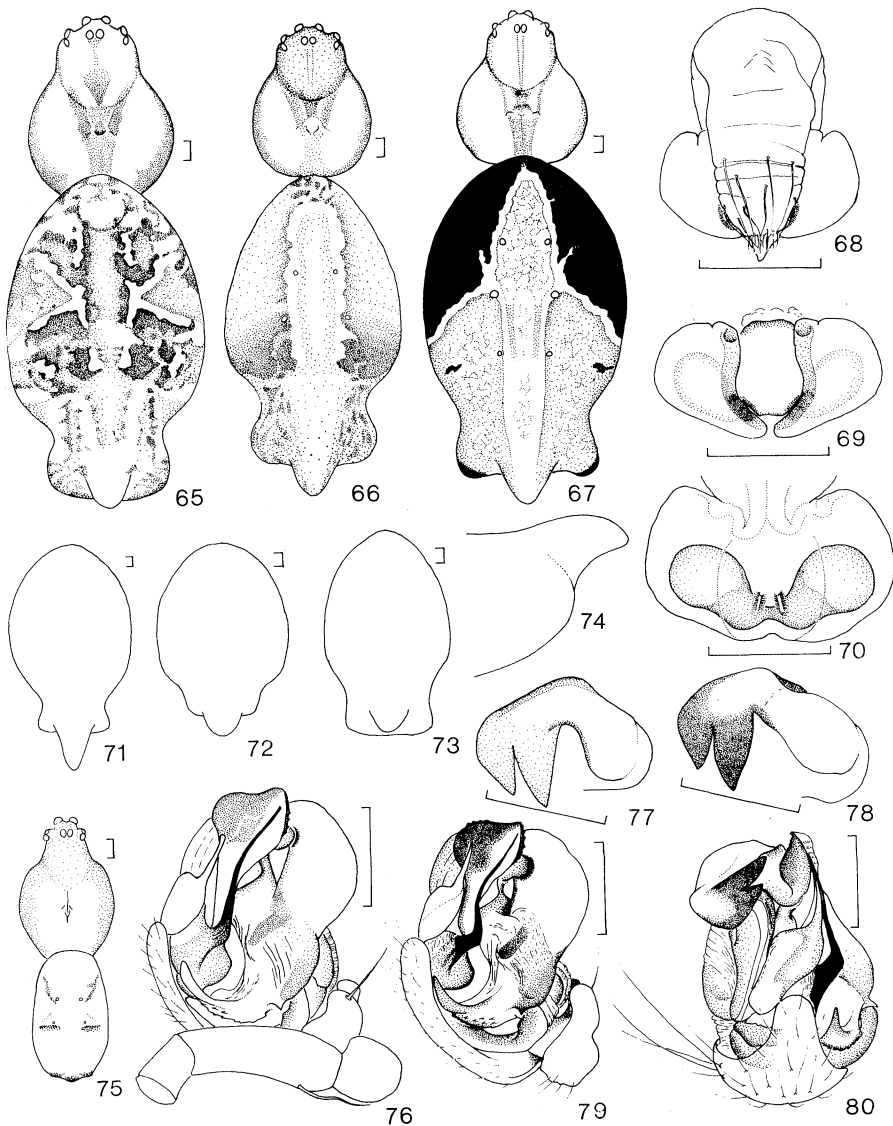
Description. Measurement (in mm). Body length ♀ 4.80–7.90, ♂ 3.03–4.45; carapace length ♀ 1.73–2.28, ♂ 1.64–1.96, width ♀ 1.38–1.95, ♂ 1.16–1.39; abdomen length ♀ 2.97–5.40, ♂ 1.47–2.35, width ♀ 1.77–3.07, ♂ 0.80–1.54. Length of legs of 1♀ from Iriomotejima Island, Okinawa Pref. and the holotype ♂ as shown in Table 7.

Table 7. Measurement of leg segments of *Cyclosa confusa* Bö. et STR., 1906 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.70/0.63	1.63/1.44	1.66/1.64	0.96/0.73	2.45/2.23	7.40/6.67
II	0.65/0.55	1.40/1.06	1.45/1.24	0.96/0.69	2.23/1.84	6.68/5.38
III	0.54/0.44	0.90/0.68	0.89/0.75	0.63/0.45	1.54/1.28	4.50/3.60
IV	0.59/0.54	1.46/1.15	1.51/1.26	0.85/0.60	2.30/1.78	6.71/5.33

Female. Carapace length/width 1.17–1.26; MOA length/width 0.90–0.96, anterior width/posterior width 1.36–1.44. Chelicera with 4 promarginal and 3–4 retromarginal teeth. Labium length/width 0.65–0.78; sternum length/width 1.10–1.15. Length of leg 1/carapace 3.18–3.37. Abdomen length/width 1.67–1.76; with three protuberances at the posterior end (Figs. 65–67, 71–73), often with one more tubercle at the anterior end. Female genitalia (Figs. 68–70): scape of epigynum slender (Fig. 68).

Male. Carapace length/width 1.40–1.48; MOA length/width 0.82–0.93, anterior width/posterior width 1.57–1.69. Chelicera with 3–4 teeth on both margin. Labium length/width 0.44–0.75; sternum length/width 1.19–1.33. Length of leg 1/carapace 3.40–3.54. Prolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 76–80): median apophysis distally bent and bifurcated (Figs. 77–78), basally with a digitiform lamella (Figs. 76, 79); embolus spiniform (Figs. 76, 79); paramedian apophysis almost hidden in prolateral view (Figs. 76, 79). Abdomen length/width 1.53–1.84; caudally with three tubercles, often indistinct (Fig. 75).



Figs. 65–80. *Cyclosa confusa* BÖSENBERG et STRAND, 1906. — 65–67. Cephalothorax and abdomen of female, dorsal view. 68. Epigynum with scape. 69. Same, without scape. 70. Female genitalia, dorsal view. 71–73. Female abdomen, dorsal view. 74. Posterior part of female abdomen, lateral view. 75. Cephalothorax and abdomen of male, dorsal view. 76. Male palp, prolateral view (holotype, SMF 3645). 77. Median apophysis of male palp (distal part) (holotype, SMF 3645). 78. Same. 79. Male palp, prolateral view. 80. Same, axial view. (Scales 0.25 mm.)

Coloration and markings. Female. Much varied. Carapace pale brown, margined with dark brown, and with dark brown median band (Figs. 65, 67); dark brown, with light coloured markings on both sides of median fovea (Fig. 66); or uniformly dark brown. Abdomen black, with longitudinal brown median band mottled with black; lateral sides of anterior half black, other part pale brown, mottled with silver (Fig. 67); lateral sides of anterior half reddish brown, other part pale brown, mottled with silver (Fig. 66); or pale brown mottled with silver, dark brown and black, with X-shaped silver markings at about the middle (Fig. 65).

Male. Carapace pale brown, margined with dark brown (Fig. 75). Abdomen pale brown, mottled with silver, and with dark coloured marking (Fig. 75).

Range. Japan, China.

Remarks. This species resembles *C. insulana* (COSTA, 1834), *C. dives* SIMON, 1877, *C. albisternis* SIMON, 1887, *C. japonica* BÖSENBERG et STRAND, 1906 and *C. norihisai* sp. nov. But it can be distinguished from *C. insulana*, *C. dives* and *C. albisternis* by the shape of the median apophysis of male palp. The median apophysis of *C. confusa* is distally bent and bifurcated (Figs. 77–78), but those of *C. insulana*, *C. dives* and *C. albisternis* are distally truncated (Figs. 59, 61, 63). As for the distinction from *C. japonica* and *C. norihisai*, see the remarks of them.

Cyclosa japonica BÖSENBERG et STRAND, 1906

[Japanese name: Yamato-gomigumo]

(Figs. 81–97, 108)

Cyclosa japonica BÖSENBERG et STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 211, fig. 2. — S. SAITO, 1939, Saito Ho-on Kai Mus. Bull., **18**: 12, fig. 2. — ROEWER, 1942, Kat. Aran., **1**: 753. — BONNET, 1956, Bibl. Aran., **2**: 1318. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 68, fig. 63, pl. 31, fig. 173; 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 658; 1977, Acta arachnol., **27** (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 119, fig. 63, pl. 33, fig. 5. — ZHU, 1983, J. Bethune med. Univ., **9** (spec. no.): 93. — PAIK & KIM, 1985, Korean Arachnol., **1**: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 86, 219, fig. 74. — KIM, 1991, Korean Arachnol., **6**: 282.

Specimens examined. 4♀♀, Yagishiritô Island, Hokkaido, 3–IX–1981, K. KUMADA leg. (NSMT–Ar 2357); 3♀♀, Ajishima Island, Oshika-gun, Miyagi Pref., 10–X–1982, K. SASAKI leg.; 2♀♀1♂, Mt. Takiyama, Utsunomiya-shi, Tochigi Pref., 14–VIII–1990, A. TANIKAWA leg. (NSMT–Ar 2358); 2♀♀, Susado, Minamiazumi-gun, Nagano Pref., 5–VIII–1974, Y. CHIKUNI leg.; 2♀♀, same locality, 7–VIII–1990, A. TANIKAWA leg. (NSMT–Ar 2359); 24♀♀, Shiro-yamakôen, Matsumoto-shi, Nagano Pref., 9–VIII–1990, A. TANIKAWA leg. (NSMT–Ar 2360); 3♀♀, Misato-mura, Minamiazumi-gun, Nagano Pref., 8–VIII–1990, A. TANIKAWA leg.; 30♀♀, Uratakao, Hachiôji-shi, Tokyo, 6–IX–1990, K. KUMADA leg.; 13♀♀1♂, 20–VIII–1990 (1♂: NSMT–Ar 2361), 2♂♂, 25–VII–1991, Hachiôji-jôshi, Hachiôji-shi, Tokyo, K. KUMADA leg.; 2♀♀1♂, Mitakekei-

koiku, Ōme-shi, Tokyo, 6-VIII-1986, K. KUMADA leg. (NSMT-Ar 2362); 1♀, 30-IX-1980, 1♀, 5-IX-1982, 6♀♀, 10-IX-1989 (5♀♀: NSMT-Ar 2363), 1♂, 8-VII-1990, Mt. Tsukui-shiroyama, Tsukui-gun, Kanagawa Pref., A. TANIKAWA leg.; 2♀♀, same locality, 7-VIII-1984, N. TANAKA leg. (NSMT-Ar 2364); 2♀♀, Mt. Komayama, Ōiso-chô, Kanagawa Pref., 23-IX-1981, K. KUMADA leg.; 1♀, 30-IX-1984, 7♀♀, 22-VIII-1990, same locality, A. TANIKAWA leg.; 1♂, Hinoharu, Kitakoma-gun, Yamanashi Pref., 19-VII-1973, K. KUMADA leg. (NSMT-Ar 2365); 3♀♀1♂, Kanmuriyama Island, Maizuru-shi, Kyoto Pref., 27~28-IX-1982, T. KAMURA leg.; 1♀, Mt. Iwawaki, Kawachinagano-shi, Osaka Pref., 23-VIII-1959, T. YAGINUMA leg. (NSMT-Ar 241, labeled *C. insulana*); 1♀, 18-VIII-1967, 1♀, 6-VIII-1968, Mt. Shinogamine, Hikami-gun, Hyogo Pref., H. TANAKA leg.; 1♀, Higashitaichi, Tamano-shi, Okayama Pref., 26-VIII-1991, A. TANIKAWA leg.; 12♀♀2♂, Mihonoseki-chô, Yatsuka-gun, Shimane Pref., 2-IX-1991, K. KUMADA leg.; 5♀♀, "Yunohama Berge", Saga, 1883, W. DÖNITZ leg. (SMF 3651, part., labeled *C. insulana*).

Description. Measurement (in mm). Body length ♀ 4.20–7.20, ♂ 3.32–4.40; carapace length ♀ 1.69–2.23, ♂ 1.70–1.98, width ♀ 1.37–1.83, ♂ 1.19–1.42; abdomen length ♀ 2.57–4.98, ♂ 1.75–2.50, width ♀ 1.71–3.38, ♂ 1.05–1.55. Length of legs of 1♀ from Kanagawa Pref. and 1♂ from Tokyo as shown in Table 8.

Table 8. Measurement of leg segments of *Cyclosa japonica* Bö. et STR., 1906 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.57/0.61	1.33/1.34	1.44/1.47	0.84/0.73	2.16/2.04	6.34/6.19
II	0.56/0.51	1.18/1.06	1.20/1.13	0.78/0.67	1.91/1.76	5.63/5.13
III	0.51/0.43	0.71/0.68	0.76/0.73	0.53/0.48	1.29/1.26	3.80/3.58
IV	0.54/0.53	1.21/1.13	1.26/1.16	0.71/0.57	1.90/1.73	5.62/5.12

Female. Carapace length/width 1.14–1.24; MOA length/width 0.93–1.06, anterior width/posterior width 1.33–1.48. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width 0.50–0.68, sternum length/width 1.03–1.13. Length of leg 1/carapace 3.15–3.58. Abdomen length/width 1.29–1.99, caudally conical, sometimes elongated, and rarely with a pair of indistinct tubercles (Figs. 81–82, 92–96). Female genitalia (Figs. 83–86): scape of epigynum acute-angled triangle and somewhat wrinkled (Figs. 83–84), internal genitalia as shown in Fig. 86.

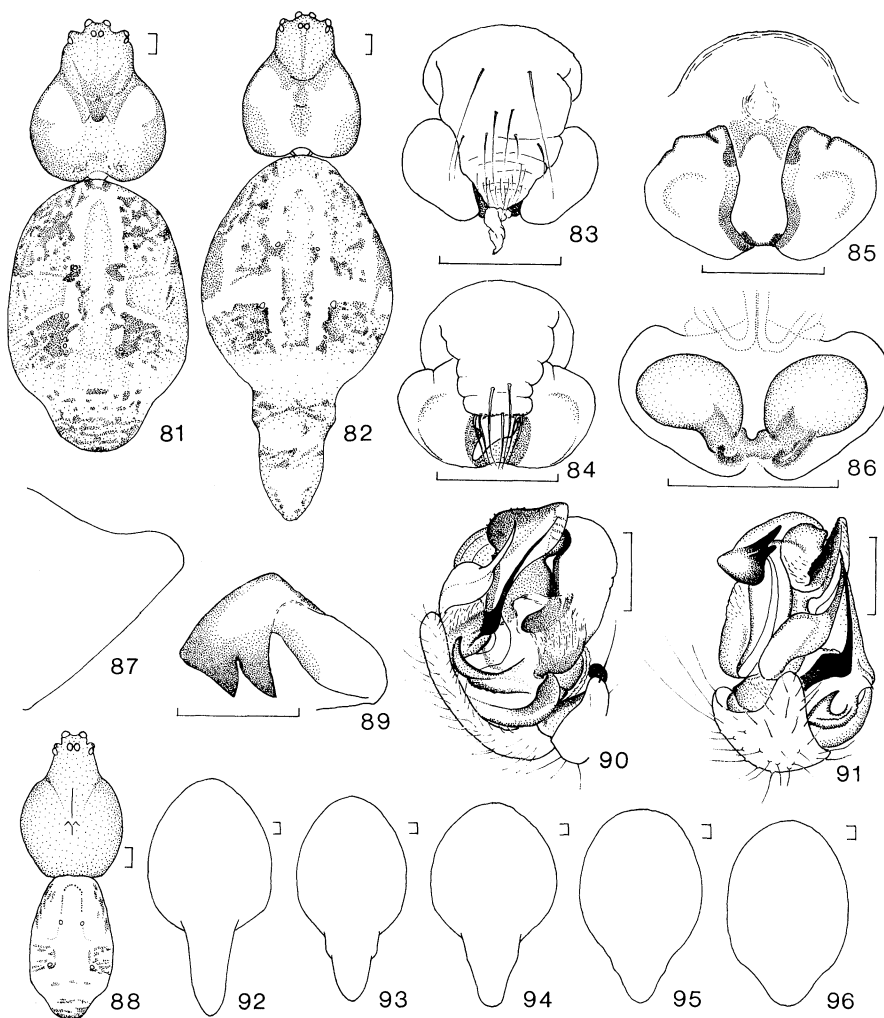
Male. Carapace length/width 1.39–1.44; MOA length/width 0.86–0.93, anterior width/posterior width 1.52–1.76. Chelicera with 3–4 promarginal and 3 retromarginal teeth. Labium length/width 0.43–0.51; sternum length/width 1.17–1.29. Length of leg 1/carapace 3.01–3.41. Retrolateral side of first femur distally with a row of short spines. Male palp (Figs. 89–91): median apophysis distally bent and bifurcated (Fig. 89), basally with a digitiform lamella (Fig. 90); embolus spiniform (Fig. 90); paramedian apophysis almost hidden in prolateral view (Fig. 90). Abdomen length/width 1.57–1.87.

Coloration and markings. Female. Carapace brown, both sides of median fovea lighter (Figs. 81–82). Abdomen pale brown, mottled with dark brown

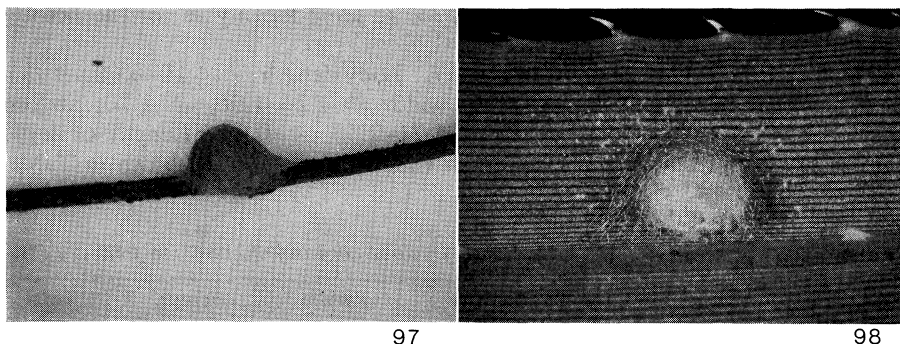
and silver (Figs. 81–82); X-shaped (Fig. 81) or transverse silver marking (Fig. 82) often distinct.

Male. Carapace brown, sometimes lighter at the middle. Abdomen silver with brown markings (Fig. 88).

Range. Japan, Korea, Taiwan.



Figs. 81–96. *Cyclosa japonica* BÖSENBERG et STRAND, 1906. — 81–82. Cephalothorax and abdomen of female, dorsal view. 83–84. Epigynum with scape. 85. Same, without scape. 86. Female genitalia, dorsal view. 87. Posterior part of female abdomen, lateral view. 88. Cephalothorax and abdomen of male, dorsal view. 89. Median apophysis of male palp (distal part). 90. Male palp, prolateral view. 91. Same, axial view. 92–96. Female abdomen, dorsal view. (Scales: 0.25 mm.)



Figs. 97–98. 97. *Cyclosa japonica* BÖSENBERG et STRAND, 1906, egg sac attached to a twig. — 98. *Cyclosa confusa* BÖSENBERG et STRAND, 1906, egg sac attached to the underside surface of a leaf.

Remarks. This species very closely resembles *C. confusa* BÖSENBERG et STRAND, 1906, but can be distinguished from the latter by the following points. Female: posterior end of abdomen is conical and without lateral protuberances (rarely with indistinct tubercles) (Figs. 81–82, 92–96), but that of *C. confusa* is provided with three protuberances (Figs. 65–67, 71–73); outline of abdomen between spinnerets and posterior end is almost straight in lateral view (Fig. 87), but that of *C. confusa* is somewhat convex at the posterior end (Fig. 74). Male: barely discriminable by the following points: palpal organ is somewhat larger than that of *C. confusa*; conductor is rather elongated in prolateral view (Fig. 90), but it is more roundish in *C. confusa* (Figs. 76, 79). The egg sac of *C. japonica* is laid tightly to the surface of a twig orange-coloured (Fig. 97), but that of *C. confusa* is yellow, and loosely attached to an under side surface of a leaf (Fig. 98).

***Cyclosa norihisai* sp. nov.**

[Japanese name: Ogasawara-gomigumo]

(Figs. 99–108)

Specimens examined. Type series. Holotype: ♀, 16–III–1988, Hahajima Island, Ogasawara, Tokyo, N. TANAKA leg. (NSMT–Ar 2366). Paratypes: 2 ♀♀, Chichijima Island, Ogasawara, Tokyo, 4–IV–1974, H. ONO leg. (NSMT–Ar 2367); 1 ♂, same locality, III–1989, F. HAGIMOTO leg. (NSMT–Ar 2368); 1 ♀, 11–III–1988 (NSMT–Ar 2369), 1 ♀, 14–III–1988 (NSMT–Ar 2370), same locality and collector as for the holotype.

Other specimens examined. 2 ♀♀, Chichijima Island, Ogasawara, Tokyo, 4–IV–1974, H. ONO leg.; 1 ♀, same locality, 20–XI–1975, K. HOSHIKAWA leg.; 4 ♀♀, same locality, 27–IX–1979, Y. MURAKAMI leg.; 1 ♀, same locality, 10–III–1988, N. TANAKA leg.; 1 ♀, same locality, III–1989, F. HAGIMOTO leg.; 1 ♀, 11–III–1988, 1 ♀, 12–III–1988, 5 ♀♀, 13–III–1988, 3 ♀♀, 14–III–1988, same

locality and collector as for the holotype; 3 ♀♀, same locality as for the holotype, 12–VIII–1990, H. TANAKA leg.

Description. Measurement (in mm). Body length ♀ 4.10–6.60, ♂ 3.20; carapace length ♀ 1.58–1.88, ♂ 1.53, width ♀ 1.26–1.56, ♂ 1.10; abdomen length ♀ 2.49–4.50, ♂ 1.77, width ♀ 1.71–2.35, ♂ 0.97. Length of legs of the holotype ♀ and the paratype 1 ♂ from Chichijima Island as shown in Table 9.

Table 9. Measurement of leg segments of *Cyclosa norihisai* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.52/0.49	1.17/0.99	1.40/1.18	0.78/0.60	1.90/1.70	5.77/4.96
II	0.48/0.41	1.04/0.86	1.19/1.03	0.72/0.56	1.65/1.45	5.08/4.31
III	0.40/0.34	0.61/0.50	0.68/0.61	0.47/0.38	1.10/0.95	3.26/2.78
IV	0.48/0.43	1.00/0.85	1.14/1.00	0.62/0.48	1.62/1.36	4.86/4.12

Female. Carapace length/width 1.21–1.31, MOA length/width 0.97–1.00, anterior width/posterior width 1.26–1.43. Chelicera with 3–4 teeth on both margin. Labium length/width 0.63–0.75, sternum length/width 1.10–1.12. Length of leg 1/carapace 3.25–3.61. Abdomen length/width 1.45–2.02, caudally with three protuberances (Figs. 99–100). Female genitalia (Figs. 101–103): scape of epigynum slender and wrinkled (Figs. 101–102), internal genitalia as shown in fig. 103.

Male. Carapace length/width 1.39; MOA length/width 0.97, anterior width/posterior width 1.61. Chelicera with 3 teeth on both margin. Labium length/width 0.67; sternum length/width 1.18. Length of leg 1/carapace 3.24. Male palp (Figs. 105–107): median apophysis distally bent and bifurcated (Fig. 105), basally with digitiform lamella and a small tooth (Fig. 107); embolus spiniform (Fig. 107); paramedian apophysis hidden in prolateral view (Fig. 107). Abdomen length/width 1.82, oval.

Coloration and markings. Female. Somewhat varied. Carapace pale brown, margined with dark brown, and with dark brown median band (Fig. 99); or dark brown with a pair of light coloured markings on both sides of the median fovea (Fig. 100). Abdomen: gray, mottled with silver and brown, brown marking surrounded by silver band often distinct (Fig. 99); or lateral sides of anterior half black, other part pale brown mottled with silver (Fig. 100).

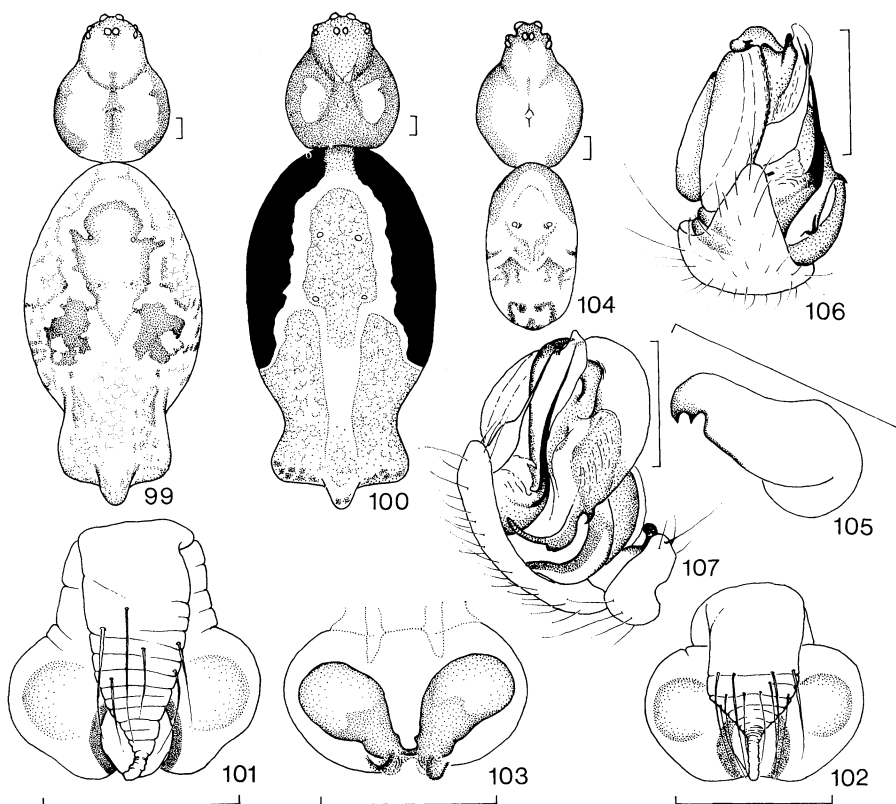
Male. Carapace brown, margined with dark brown (Fig. 104). Abdomen silvery pale brown, with dark coloured markings (Fig. 104).

Range. Japan (Ogasawara Islands).

Remarks. This species resembles *C. confusa* BÖSENBERG et STRAND, 1906, but can be distinguished from the latter by the following points. Female: 2nd leg is slightly longer than 4th leg (4th leg/2nd leg 0.96–0.99), while in *C. confusa*, 2nd leg is as long as or slightly shorter than 4th leg (4th leg/2nd leg 1.00–1.05). Male: prolateral side of first femur is without a row of spines, but in *C. confusa*, it is provided distally with a row of short spines; distal part of median apophysis is small (Fig. 105), but that of *C. confusa* is much larger (Figs. 77–78); shape of conductor in prolateral view is also different (Figs. 76, 79, 107). This species also resembles *C. omonaga* sp. nov., but can be distinguished from the latter by

the following points. Female: 2nd leg is slightly longer than 4th leg (4th leg/2nd leg 0.96–0.99), but in *C. omonaga*, 2nd leg is as long as or slightly shorter than 4th leg (4th leg/2nd leg 1.00–1.06); scape of epigynum is slender (Figs. 101–102), but that of *C. omonaga* is rather wider and much wrinkled (Figs. 47–48). Male: distal part of palpal median apophysis is bent and bifurcated (Fig. 105), but that of *C. omonaga* is also bent but truncated (Fig. 53); the shape of conductor also different (Figs. 54, 107).

Etymology. Named after Mr. Norihisa TANAKA, Yokohama.



Figs. 99–107. *Cyclosa norihisai* sp. nov. — 99–100. Cephalothorax and abdomen of female, dorsal view. 101–102. Epigynum with scape. 103. Female genitalia, dorsal view. 104. Cephalothorax and abdomen of male, dorsal view. 105. Median apophysis of male palp (distal part). 106. Male palp, axial view. 107. Same, prolateral view. (Scales: 0.25 mm.)

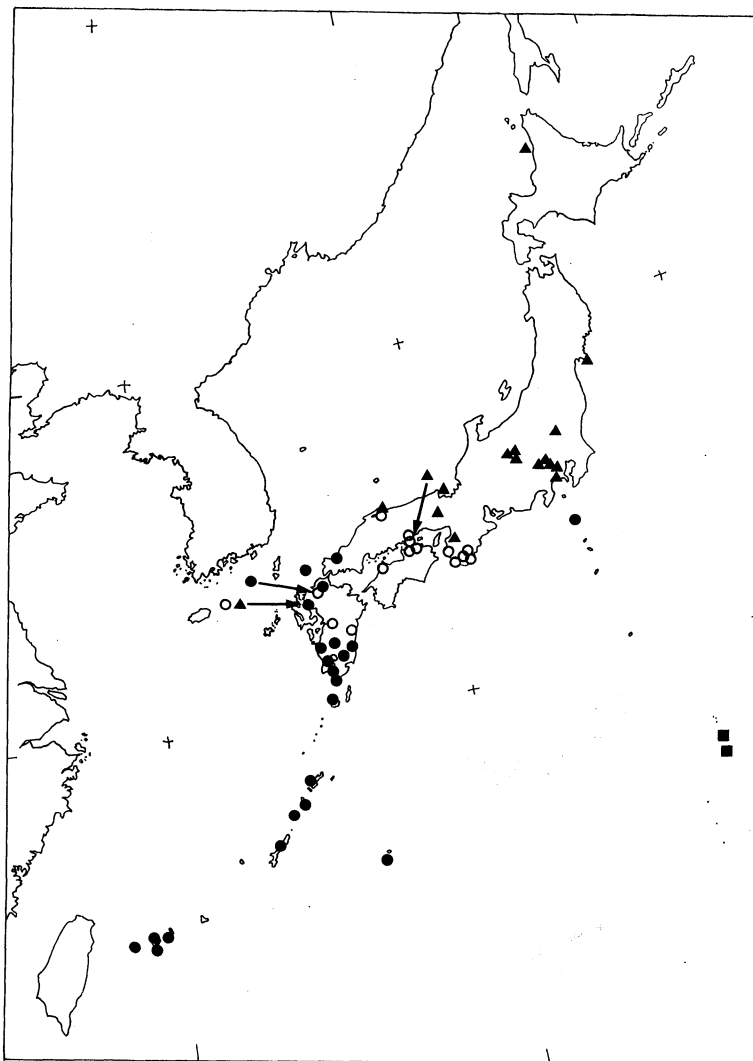


Fig. 108. Distribution of *Cyclosa omonaga* sp. nov., *Cyclosa confusa* BÖSENBERG et STRAND, 1906, *Cyclosa japonica* BÖSENBERG et STRAND, 1906, and *Cyclosa norihisai* sp. nov. in Japan, based on the specimens examined in this study. ○: *C. omonaga*; ●: *C. confusa*; ▲: *C. japonica*; ■: *C. norihisai*.

***Cyclosa atrata* BÖSENBERG et STRAND, 1906**

[Japanese name: Karasu-gomigumo]

(Figs. 109–118, 130)

Cyclosa atrata BÖSENBERG et STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 204, pl. 4, fig. 28, pl. 15, fig. 417. — S. SAITO, 1939, Saito Ho-on Kai Mus. Bull., **18**: 11; 1959, Spid. Book Illustr. Col., p. 97, fig. 6, pl. 14, fig. 109, pl. 16, fig. 109. — ROEWER, 1942, Kat. Aran., **1**: 753. — BONNET, 1956, Bibl. Aran., **2**: 1308. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 68, pl. 31, fig. 171; 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 658; 1977, Acta arachnol., **27** (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 3. — ZHU, 1983, J. Bethune med. Univ., **9** (spec. no.): 28. — PAIK & KIM, 1985, Korean Arachnol., **1**: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — KIM, 1991, Korean Arachnol., **6**: 282.

Specimens examined. Type series. Syntypes: 11♀♀1♂, Saga, 1882, W. DÖNITZ leg. (SMF 3643).

Other specimens examined. 1♀, Univ. of Tsukuba, Tsukuba-shi, Ibaragi Pref., 4–IX–1975, T. TAKAI leg.; 3♀♀2♂♂, Takiyamakyûryô, Hachiôji-shi, Tokyo, 7–IX–1988, K. KUMADA leg. (NSMT–Ar 2371); 1♀1♂, Nozuda, Machida-shi, Tokyo, 17–VI–1989, A. SHINKAI leg. (1♂: NSMT–Ar 2372); 79♀♀26♂♂, 10–VI–1990 (12♀♀6♂♂: NSMT–Ar 2373), 8♀♀, 23–VIII–1990, same locality, A. TANIKAWA leg.; 1♀1♂, Mt. Yoshinoyama, Yoshino-gun, Nara Pref., 23–VIII–1967, T. YAGINUMA leg. (NSMT–Ar 239); 1♀, 28–IX–1968, 6♀♀, 22–VIII–1971, Yoshino, Yoshino-gun, Nara Pref., H. TANAKA leg.; 27♀♀1♂, Asahigawa dam, Mitsu-gun, Okayama Pref., 25–VIII–1955, C. OKUMA leg.; 1♀1♂, Daisen-chô, Saihaku-gun, Tottori Pref., 1–IX–1991, K. KUMADA leg.; 2♀♀1♂, Yoshimuta, Kamimashiki-gun, Kumamoto Pref., 14–VIII–1990, S. TAZOE leg.

Description. Measurement (in mm). Body length ♀ 6.37–10.25, ♂ 3.60–4.63; carapace length ♀ 1.89–2.33, ♂ 1.78–1.92, width ♀ 1.81–1.48, ♂ 1.22–1.33; abdomen length ♀ 4.25–8.10, ♂ 1.78–2.60, width ♀ 1.45–2.55, ♂ 0.80–1.14. Length of legs of the syntypes 1♀1♂ as shown in Table 10.

Table 10. Measurement of leg segments of *Cyclosa atrata* Bös. et STR., 1906 (in mm; ♀/♂).

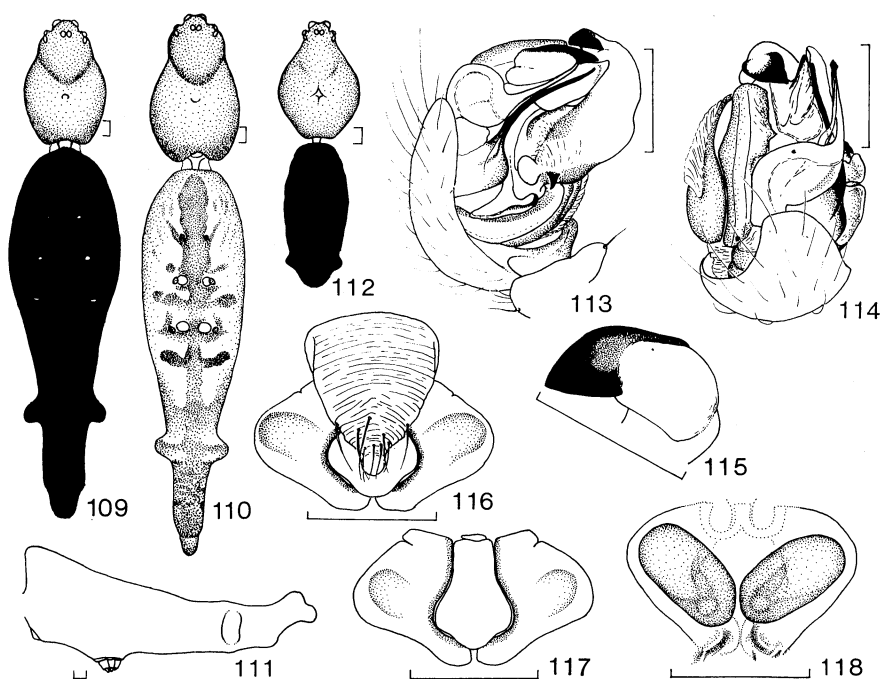
Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.58/0.55	1.06/1.07	1.29/1.29	0.77/0.62	1.87/1.66	5.57/5.19
II	0.54/0.45	0.93/0.77	1.10/0.90	0.70/0.56	1.62/1.40	4.89/4.08
III	0.44/0.38	0.63/0.55	0.70/0.61	0.51/0.39	1.18/1.02	3.46/2.95
IV	0.56/0.39	1.07/0.92	1.27/1.00	0.68/0.51	1.74/1.43	5.32/4.25

Female. Carapace length/width 1.48–1.60; MOA length/width 0.88–0.97, anterior width/posterior width 1.56–1.76. Chelicera with 4 promarginal and 2–3 retromarginal teeth. Labium length/width 0.68–0.77; sternum length/width 1.31–1.40. Length of leg 1/carapace 2.46–2.66. Abdomen length/width 2.93–3.41; slender; caudal end vertically bifurcated (sometimes indistinct) (Fig. 111); with

a pair of lateral humps at about $1/4$ or $1/3$ from the caudal end (Figs. 109–111); ventrally, with a tubercle between lateral humps and caudal end (Fig. 111), and sometimes with a tubercle between spinnerets and lateral humps. Female genitalia (Figs. 116–118): scape of epigynum triangular and wrinkled (Fig. 116); internal genitalia as shown in Fig. 118.

Male. Carapace length/width 1.43–1.50, MOA length/width 0.84–0.90, anterior width/posterior width 1.67–1.82. Chelicera with 3–4 promarginal and 3 retromarginal teeth. Labium length/width 0.56–0.65, sternum length/width 1.23–1.41. Length of leg 1/carapace 2.63–2.70. Male palp (Figs. 113–115): median apophysis distally bent, flattened, and truncated (Fig. 115), basally with a small round lamella and a small tooth (Fig. 113); embolus spiniform (Fig. 113); paramedian apophysis large and visible in prolateral view (Fig. 113). Abdomen length/width 1.85–2.45, caudally with a pair of lateral tubercles (Fig. 112).

Coloration and markings. Female. Carapace dark brown. Abdomen somewhat varied: black, sometimes with two or three pairs of silver spots (Fig. 109); or silvery dark brown with dark coloured marking, and sometimes with two or three pairs of silver spots (Fig. 110).



Figs. 109–118. *Cyclosa atrata* BÖSENBERG et STRAND, 1906. — 109–110. Cephalothorax and abdomen of female, dorsal view. 111. Female abdomen, lateral view. 112. Cephalothorax and abdomen of male, dorsal view. 113. Male palp, prolateral view. 114. Same, axial view. 115. Median apophysis of male palp (distal part). 116. Epigynum with scape. 117. Same, without scape. 118. Female genitalia, dorsal view. (Scales: 0.25 mm.)

Male. Carapace dark brown. Abdomen black (Fig. 112), sometimes with one or two pairs of silver spots.

Range. Japan, China, Korea.

Remarks. This species closely resembles *C. hamulata* sp. nov. As for the discrimination, see the remarks of *C. hamulata*.

***Cyclosa hamulata* sp. nov.**

[Japanese name: Kagizume-karasu-gomigumo]

(Figs. 119–130)

Cyclosa atrata : CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 86, 220, fig. 76. [nec *C. atrata* BÖSENBERG et STRAND, 1906].

Specimens examined. Type series. Holotype: ♂, Mt. Izugatake, Chichibu, Saitama Pref., 6–VIII–1973, K. KUMADA leg. (NSMT–Ar 2374). Allotype: ♀, same data as for the holotype (NSMT–Ar 2375). Paratypes: 1 ♀, Miasamura, Kitaazumi-gun, Nagano Pref., 29–VII–1990, Y. SAIJO leg. (NSMT–Ar 2376); 1 ♂, Sugadaira, Chisagata-gun, Nagano Pref., 29–VII–1980, A. UYEMURA leg. (NSMT–Ar 2377); 1 ♀, same locality, 25–VIII–1982, A. TANIKAWA leg. (NSMT–Ar 2378); 1 ♂, Fuezuka, Hakone, Kanagawa Pref., 29–VII–1979, H. ONO leg. (NSMT–Ar 2379); 1 ♀, Kawaguchiko, Minamitsuru-gun, Yamanashi Pref., 11–VIII–1983, A. TANIKAWA leg. (NSMT–Ar 2380); 1 ♂, Subashiri, Suntô-gun, Shizuoka Pref., 30–VII–1990, A. SHINKAI leg. (NSMT–Ar 2381); 1 ♂, Nagasaka-chô, Kitakoma-gun, Yamanashi Pref., 28–VII–1990, K. KUMADA leg. (NSMT–Ar 2382); 2 ♀ ♀, Ogisukeikoku, Suzuka-shi, Mie Pref., 13–VIII–1981, A. UYEMURA leg. (NSMT–Ar 2383).

Other specimens examined. 1 ♀, Hokkaido Univ., Sapporo-shi, Hokkaido, 7–VIII–1981, A. TANIKAWA leg.; 1 ♂, Hokkaido, 7–VIII–1966, H. TANAKA leg.; 2 ♀ ♀, Tazawako, Senboku-gun, Akita Pref., 18–VIII–1990, A. TANIKAWA leg.; 2 ♀ ♀, Kirifurinotaki, Nikkô-shi, Tochigi Pref., 13–VIII–1990, A. TANIKAWA leg.; 4 ♀ ♀, Mt. Nakimushiyama, Nikkô-shi, Tochigi Pref., 14–VIII–1990, A. TANIKAWA leg.; 1 ♀, Utsunomiya-shinrinkôen, Utsunomiya-shi, Tochigi Pref., 12–VIII–1990, A. TANIKAWA leg.; 2 ♀ ♀, 7–VIII–1990, 1 ♀, 8–VIII–1990, Susado, Minamiazumi-gun, Nagano Pref., A. TANIKAWA leg.; 1 ♀, Shiroyamakôen, Matsumoto-shi, Nagano Pref., 9–VIII–1990, A. TANIKAWA leg.; 1 ♀, Misato-mura, Minamiazumi-gun, Nagano Pref., 8–VIII–1990, A. TANIKAWA leg.; 1 ♀, Chichibu, Saitama Pref., VIII–1981, A. TANIKAWA leg.; 1 ♀ 1 ♂, 30–VII–1990, 1 ♀ 1 ♂, 13–VI–1991, Subashiri, Suntô-gun, Shizuoka Pref., A. SHINKAI leg.; 1 ♀, Hirogawara, Kyoto-shi, Kyoto Pref., 29–VIII–1969, H. TANAKA leg.; 1 ♀, Kiwa-chô, Minamimuro-gun, Mie Pref., 3–VIII–1991, A. TANIKAWA leg.; 11 ♀ ♀ 2 ♂ ♂, 10–VIII–1969, 2 ♀ ♀ 29–VII–1970, Mt. Kôyasan, Ito-gun, Wakayama Pref., H. TANAKA leg.; 2 ♀ ♀ 1 ♂, Nose-chô, Toyono-gun, Osaka Pref., 10–VIII–1979, T. KAMURA leg.; 2 ♀ ♀, Mt. Shinogamine, Hikami-gun, Hyogo Pref., 18–VIII–1967, H. TANAKA leg.

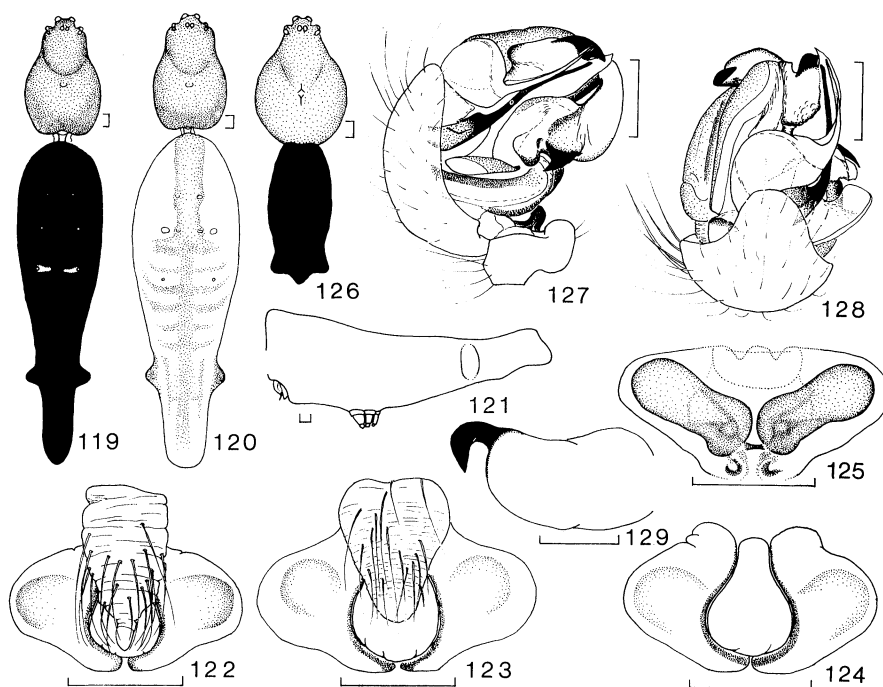
Description. Measurement (in mm). Body length ♀ 6.73–11.44, ♂ 4.08–4.85; carapace length ♀ 2.02–2.60, ♂ 2.04–2.38, width ♀ 1.18–1.60, ♂ 1.38–1.58; abdomen length ♀ 4.40–9.10, ♂ 1.96–2.49, width ♀ 1.13–2.30, ♂ 0.90–

1.24. Length of legs of the paratype 1 ♀ from Saitama Pref. and the holotype ♂ as shown in Table 11.

Table 11. Measurement of leg segments of *Cyclosa hamulata* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.64/0.56	1.22/1.15	1.47/1.35	0.84/0.64	2.04/1.66	6.21/5.36
II	0.61/0.50	1.10/0.82	1.29/0.96	0.80/0.57	1.83/1.40	5.63/4.25
III	0.50/0.42	0.76/0.59	0.82/0.65	0.56/0.37	1.33/1.03	3.97/3.06
IV	0.63/0.49	1.31/0.99	1.50/1.08	0.78/0.52	1.96/1.45	6.18/4.53

Female. Carapace length/width 1.57–1.72; MOA length/width 0.92–1.05, anterior width/posterior width 1.44–1.67. Chelicera with 4 promarginal and 3–4 retromarginal teeth. Labium length/width 0.64–0.74; sternum length/width 1.31–1.36. Length of leg 1/carapace 2.52–2.66. Abdomen length/width 3.04–4.15; slender; caudal end vertically bifurcated (often indistinct) (Fig. 121); with a pair of lateral humps at about 1/4 or 1/3 from the caudal end (Figs. 119–121);



Figs. 119–129. *Cyclosa hamulata* sp. nov. — 119–120. Cephalothorax and abdomen of female, dorsal view. 121. Female abdomen, lateral view. 122–123. Epigynum with scape. 124. Same, without scape. 125. Female genitalia, dorsal view. 126. Cephalothorax and abdomen of male, dorsal view. 127. Male palp, prolateral view. 128. Same, axial view. 129. Median apophysis of male palp (distal part). (Scales: 0.25 mm.)

ventrally, with a tubercle between lateral humps and caudal end (Fig. 121). Female genitalia (Figs. 122–125); Scape of epigynum triangular (Fig. 123) or more slender (Fig. 122), wrinkled; internal genitalia as shown in Fig. 125.

Male. Carapace length/width 1.47–1.51; MOA length/width 0.83–0.92, anterior width/posterior width 1.67–1.75. Chelicera with 4 promarginal and 3–4 retromarginal teeth. Labium length/width 0.50–0.59; sternum length/width 1.22–1.36. Length of leg 1/carapace 2.58–2.68. Male palp (Figs. 127–129): median

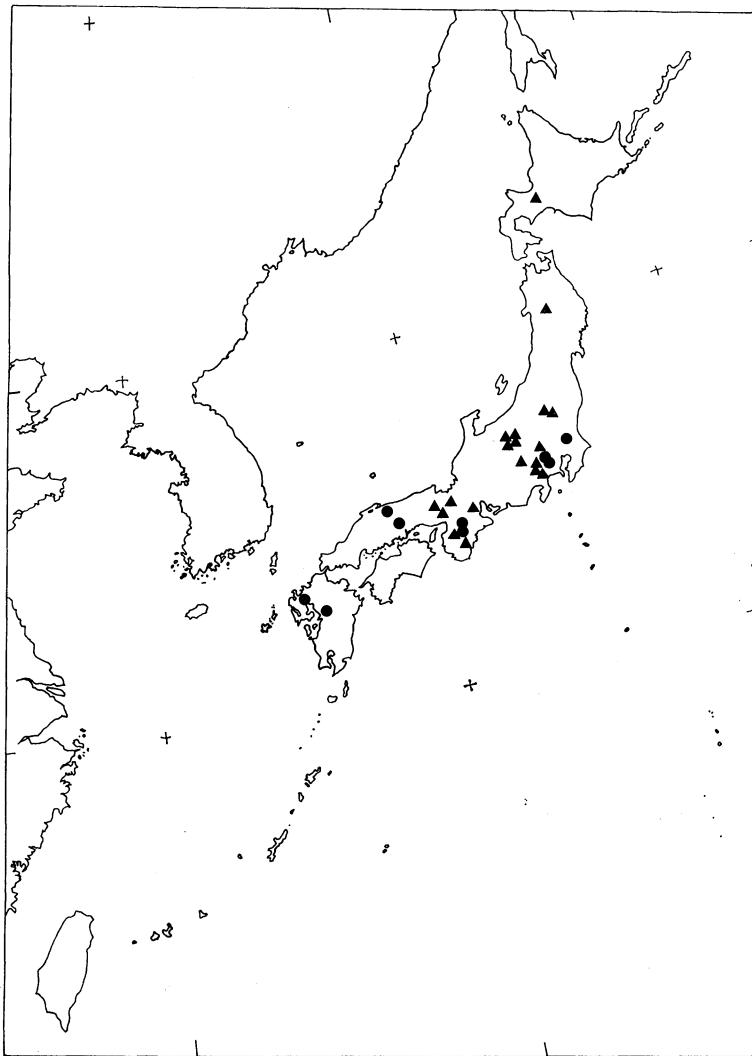


Fig. 130. Distribution of *Cyclosa atrata* BÖSENBERG et STRAND, 1906, and *Cyclosa hamulata* sp. nov. in Japan, based on the specimens examined in this study. ●: *C. atrata*; ▲: *C. hamulata*.

apophysis distally hook-shaped (Fig. 129), basally with a small round lamella and a triangular appendix (Fig. 127); embolus spiniform (Fig. 127); paramedian apophysis large and visible in prolateral view (Fig. 127). Abdomen length/width 1.96–2.34, caudally with a pair of lateral tubercles (Fig. 126).

Coloration and markings. Female. Carapace dark brown. Abdomen: somewhat varied; black, with one or two pairs of silver spots (Fig. 119); or silvery brown with dark coloured markings, sometimes with one or two pairs of silver spots (Fig. 120).

Male. Carapace dark brown. Abdomen black (Fig. 126), sometimes with two pairs of silver spots.

Range. Japan.

Remarks. This species very closely resembles *C. atrata*, BÖSENBERG et STRAND, 1906, but can be distinguished from the latter by the following points. Female: barely discriminable by the shape of genital organ; epigynum is rather wider, spermathecae are more elongated (Figs. 122–125) than those of *C. atrata* (Figs. 116–118). Male: palpal median apophysis is distally hook-shaped (Fig. 129), but that of *C. atrata* is bent, flattened, and truncated (Fig. 115); median apophysis is basally provided with a triangular appendix and a round lamella (Fig. 127), but that of *C. atrata* is provided with a spiniform appendix and a round lamella (Fig. 113).

Etymology. The specific name is due to the shape of distal part of median apophysis of male palp.

Cyclosa maritima sp. nov.

[Japanese name: Hama-gomigumo]

(Figs. 131–142, 181)

Cyclosa litoralis: YAGINUMA & SHINKAI, 1975, *Atypus*, (64): 26. [nec *C. litoralis* (L. KOCH, 1867)].

Cyclosa camelodes: SHINKAI, 1977, *Acta arachnol.*, **27** (spec. no.): 328. — YAGINUMA, 1977, *Acta arachnol.*, **27** (spec. no.): 387; 1986, *Spid. Japan Col.* (n. ed.), p. 120, fig. 63, pl. 33, fig. 6. [nec *C. camelodes* (THORELL, 1878)].

Specimens examined. Type series. Holotype: ♀, Chichijima Island, Ogasawara, Tokyo, 9–III–1988, N. TANAKA leg. (NSMT–Ar 2390). Allotype: ♂, same data as for the holotype (NSMT–Ar 2384). Paratypes: 1 ♀, 10–III–1988, same locality and collector as for the holotype (NSMT–Ar 2385). 1 ♂, Hahajima Island, Ogasawara, Tokyo, 28–VII–1986, S. TOBANO leg. (NSMT–Ar 2386). 1 ♀ 1 ♂, 13–III–1988 (NSMT–Ar 2387), 1 ♀ 2 ♂, 12–III–1988 (NSMT–Ar 2388), same locality, N. TANAKA leg. 1 ♀, Iôjima Island, Ogasawara, Tokyo, 29–XI–1987, N. TANAKA leg. (NSMT–Ar 2389).

Other specimens examined. 4 ♀ ♀, 30–III–1974, 9 ♀ ♀ 2 ♂ ♂, 1–IV–1974, 3 ♀ ♀ 1 ♂, 2–IV–1974, 2 ♀ ♀, 3–IV–1974, 3 ♀ ♀, 4–IV–1974, 2 ♀ ♀ 1 ♂, 5–IV–1974, same locality as for the holotype, H. ONO leg.; 1 ♀, same locality, 20–XI–1975, K. HOSHIKAWA leg.; 7 ♀ ♀ 1 ♂, 9–III–1988, 17 ♀ ♀ 4 ♂ ♂, 10–III–1988, 1 ♀ 1 ♂, 18–III–1988, same locality, N. TANAKA leg.; 2 ♀ ♀ 2 ♂ ♂, Hahajima Island, Ogasawara, Tokyo, 22–I–1980, C. OKUMA leg.; 1 ♀, same locality, 28–VIII–1986, S. TOBANO

leg.; 10♀♀3♂♂, 11-III-1988, 3♀♀2♂♂, 12-III-1988, 3♀♀1♂, 13-III-1988, 9♀♀3♂♂, 14-III-1988, 2♀♀, 15-III-1988, 5♀♀5♂♂, 16-III-1988, same locality, N. TANAKA leg.; 3♀♀2♂♂, same locality, 11-VIII-1990, H. TANAKA leg.; 2♂♂, Ogasawara, Tokyo, III-1989, F. HAGIMOTO leg.

Specimens examined for comparison. *Cyclosa camelodes* (THORELL, 1878): Holotype, ♀, Amboina, 1874, O. BECCARI leg. (MCSN; Figs. 143-145); 1♀1♂, New Britain, Valoka, 8-VI-1962, Noona Dan Exp. 61-62 (ZMK); 1♀1♂, Bismark Islands, Duke of York, Mannan, 19-VI-1962, Noona Dan Exp. 61-62 (ZMK); 1♀2♂♂, Jayapura, Irian Jaya, Indonesia, 3~5-VIII-1982, A. TANIKAWA leg.; 1♀, Wamena, Irian Jaya, Indonesia, 1~3-VIII-1982, A. TANIKAWA leg.

Description. Measurement (in mm). Body length ♀ 4.65-7.50. ♂ 2.90-4.10; carapace length ♀ 1.53-2.25, ♂ 1.55-1.86, width ♀ 1.13-1.68, ♂ 1.13-1.29; abdomen length ♀ 2.66-5.07, ♂ 1.45-2.07, width ♀ 1.77-2.73, ♂ 0.95-1.69. Length of legs of the holotype ♀ and the allotype ♂ as shown in Table 12.

Table 12. Measurement of leg segments of *Cyclosa maritima* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.51/0.47	1.02/0.90	1.16/1.00	0.81/0.63	1.70/1.53	5.20/4.53
II	0.47/0.43	1.02/0.82	0.95/0.75	0.76/0.58	1.49/1.34	4.69/3.92
III	0.41/0.34	0.56/0.52	0.54/0.44	0.50/0.38	0.97/0.87	2.98/2.55
IV	0.48/0.43	1.03/0.89	0.95/0.83	0.69/0.52	1.59/1.37	4.74/4.04

Female. Carapace length/width 1.27-1.35; MOA length/width 0.97-1.00, anterior width/posterior width 1.29-1.45. Chelicera with 2-3 teeth on both margin. Labium length/width 0.59-0.65; sternum length/width 1.18-1.24. Length of leg 1/carapace 2.41-2.73. Abdomen length/width 1.50-1.96, anteriorly with a pair of dorsal tubercles, posteriorly conical (Figs. 136-137), ventrally with a pair of tubercles between spinneret and epigynum (sometimes indistinct). Female genitalia (Figs. 138-142): scape of epigynum as long as wide or slightly longer than wide (Figs. 138-140); internal genitalia as shown in Fig. 142.

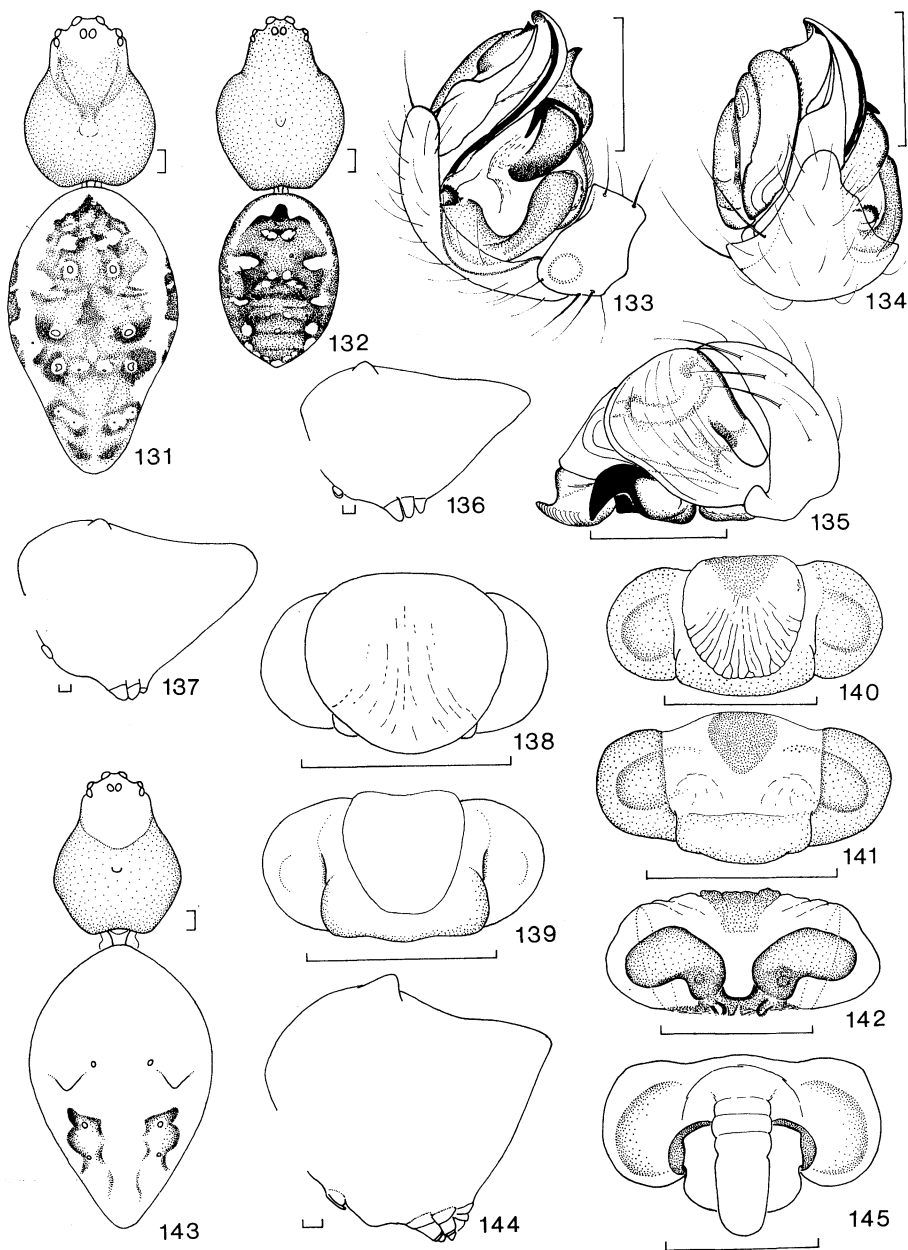
Male. Carapace length/width 1.33-1.50, MOA length/width 0.94-1.00, anterior width/posterior width 1.28-1.50. Chelicera with 2-3 teeth on both margin. Labium length/width 0.50-0.69, sternum length/width 1.13-1.23. Length of leg 1/carapace 2.57-2.68. Prolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 133-135): median apophysis with a large appendix folded over (Fig. 133); embolus filiform, wrapped in an edge of conductor (Fig. 133); paramedian apophysis visible in prolateral view (Fig. 133). Abdomen length/width 1.20-1.54, oval, caudal end pointed (sometimes indistinct) (Fig. 132).

Coloration and markings. Female. Carapace dark brown, anteriorly paler (Fig. 131). Abdomen pale brown, mottled with dark brown (Fig. 131).

Male. Carapace dark brown (Fig. 132). Abdomen brown, mottled with dark brown and white (Fig. 132).

Range. Japan (Ogasawara Islands).

Remarks. This species resembles *C. camelodes* (THORELL, 1878), but can be distinguished from the latter by the following points. Female: epigynum is



Figs. 131–145. 131–142. *Cyclosa maritima* sp. nov. — 131. Cephalothorax and abdomen of female, dorsal view. 132. Cephalothorax and abdomen of male, dorsal view. 133. Male palp, prolateral view. 134. Same, axial view. 135. Same, retrolateral view. 136–137. Female abdomen, lateral view. 138–140. Epigynum with scape. 141. Same, without scape. 142. Female genitalia, dorsal view. 143–145. *Cyclosa camelodes* (THORELL, 1878.) (holotype, MCSN) — 143. Cephalothorax and abdomen of female, dorsal view. 144. Female abdomen, lateral view. 145. Epigynum. (Scales: 0.25 mm.)

often without scapes (Fig. 141), and if exist, it is nearly as long as wide or slightly longer than wide (Figs. 138–140), but epigynum of *C. camelodes* seems to be always with scape, scape is distinctly longer than wide (Fig. 145). Male: palpal median apophysis is provided with a large appendix folded over (Fig. 133), but that of *C. camelodes* is provided with a small tooth at the middle.

Etymology. Specific name is due to its habitat.

***Cyclosa psylla* (THORELL, 1887)**

[Japanese name: Himemaru-gomigumo]

(Figs. 146–148, 181)

Epeira psylla THORELL, 1887, Ann. Mus. civ. Stor. nat. Genova, **25**: 214.

Aranea psylla: BÖSENBERG & STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 236. — ROEWER, 1942, Kat. Aran., **1**: 820.

Araneus psyllus: BONNET, 1955, Bibl. Aran., **2**: 571. — YAGINUMA, 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 657.

Cyclosa psylla: YAGINUMA, 1977, Acta arachnol., **27** (spec. no.): 387.

Specimen examined. 1♀, Saga, Japan, W. DÖNITZ leg. (SMF 3352).

Description. Measurement (in mm). Body length ♀ 2.40; carapace length ♀ 1.08, width ♀ 0.92; abdomen length ♀ 1.42, width ♀ 1.27. Length of legs of 1♀ from Saga Pref. as shown in Table 13.

Table 13. Measurement of leg segments of *Cyclosa psylla* (THORELL, 1881) (in mm; ♀).

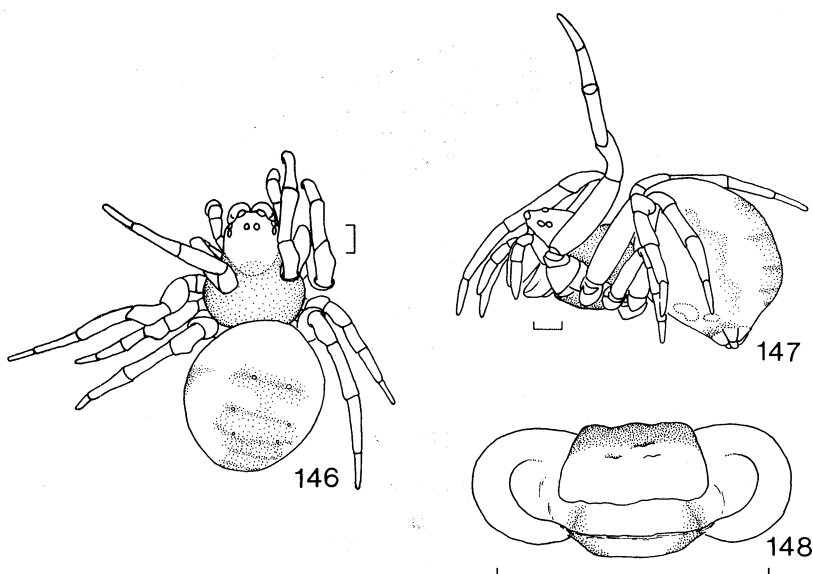
Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.45	0.63	0.62	0.47	0.92	3.09
II	0.33	0.57	0.52	0.44	0.88	2.74
III	0.28	0.34	0.31	0.30	0.64	1.87
IV	0.33	0.52	0.50	0.39	0.84	2.58

Female. Carapace length/width 1.17; MOA length/width 1.00, anterior width/posterior width 1.43. Chelicera with 3 promarginal and 2 retromarginal teeth. Labium length/width 0.71; sternum length/width 1.14. Length of leg I/carapace 2.86. Abdomen length/width 1.12, oval (Fig. 146). Female genitalia (Fig. 148): epigynum with C-shaped sclerotized lobe.

Coloration and markings. Female. Carapace dark brown, anteriorly paler (Fig. 146). Abdomen white, with brown markings (Figs. 146–147).

Range. Japan (Saga Pref.), Burma.

Remarks. This species can be easily distinguished from other Japanese species of the genus by the small size and the shape of epigynum.



Figs. 146–148. *Cyclosa psylla* (THORELL, 1887). — 146. Female, dorsal view. 147. Same, lateral view. 148. Epigynum. (Scales: 0.25 mm.)

***Cyclosa mulmeinensis* (THORELL, 1887)**

[Japanese name: Toge-gomigumo]

(Figs. 149–165, 181)

Epeira mulmeinensis THORELL, 1887, Ann. Mus. civ. Stor. nat. Genova, **25**: 221; 1895, Descr. Catal. Spid. Burma, p. 192. — WORKMAN, 1896, Malays. Spid., p. 37, pl. 37. *Cyclosa mulmeinensis*: SIMON, 1908, Bull. sci. Fr. Belg., **42**: 104. — ROEWER, 1942, Kat. Aran., **1**: 718. — CHRYSANTHUS, 1961, Nova Guinea, Zool., **10**: 203, figs. 34–36; 1971, Zool. Verh., **113**: 23, 25, figs. 120–122. — SHIMOJANA, 1963, Atypus, (28): 29. — YAGINUMA, 1967, Fac. Let. Rev. Otemon Gakuin Univ., **1**: 95, fig. 2; 1968, Spid. Japan Col. (rev. enl. ed.), p. 129, fig. 106; 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 658; 1977, Acta arachnol., **27** (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 5. — TIKADER, 1982, Fauna India, Spid., Vol. 2, p. 187, figs. 356–360. ROBERTS, 1983, Zool. Jour. Linn. Soc., **77**: 258, 261, figs. 155–157. — ZHU, 1983, J. Bethune med. Univ., **9** (spec. no.): 29. — PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 85, 219, fig. 71. — TANIKAWA, 1990, Atypus, (96): 5, figs. 16–32. *Argyrodes longispinus* SAITO, 1933, Tarns. Sapporo nat. Hist. Soc., **13**: 45, pl. 3, fig. 26.

Specimens examined. 2♀♀, 7–XI–1962, 2♀♀, 11–XI–1962, Amami-ôshima Island, Kagoshima Pref., C. OKUMA leg.; 15♀♀1♂, 23–VIII–1989, 2♀♀1♂, 24–VIII–1989 (1♀: NSMT–Ar 2391), 4♀♀, 25–VIII–1989, 1♀, 26–VIII–1989, 1♀1♂, 28–VIII–1989 (NSMT–Ar 2892), same locality, A. TANIKAWA leg.; 2♀♀,

Okinoerabujima Island, Kagoshima Pref., 24-III-1969, H. TANAKA leg.; 1 ♀, Okinawajima Island, Okinawa Pref., 6-III-1961, M. Kôno leg. (NSMT-Ar 244); 5 ♀ ♀, 1-VI-1977, same locality, Y. CHIKUNI leg.; 5 ♀ ♀ 1 ♂, 1-II-1988, 1 ♀, 2-II-1988, same locality, N. TANAKA, leg.; 2 ♀ ♀, Minami-daitôjima Island, Okinawa Pref., 8~9-V-1981, C. OKUMA leg.; 1 ♀, Ishigakijima Island, Okinawa Pref., 2-V-1990, T. AKABANE leg.; 3 ♀ ♀, 29-III-1983, 4 ♀ ♀, 30-III-1983, 7 ♀ ♀ 5 ♂ ♂, 26-III-1985, 2 ♀ ♀, 28-III-1985, 1 ♀, 29-III-1985, 2 ♀ ♀, 30-III-1985, 1 ♀, 10-VIII-1985, 1 ♀, 17-VIII-1985, 3 ♀ ♀ 1 ♂, 27-III-1986, 1 ♀, 1-IV-1986 (NSMT-Ar 2393), 1 ♂, 28-XII-1986, 2 ♀ ♀, 29-XII-1986 (NSMT-Ar 2394), 3 ♀ ♀ 5 ♂ ♂, 31-XII-1986, 2 ♀ ♀, 28-III-1987, 2 ♀ ♀, 4-I-1988, 2 ♀ ♀, 30-III-1988, 2 ♀ ♀, 19-VIII-1988 (NSMT-Ar 2395), 1 ♀ 1 ♂, 3-I-1989, 6 ♀ ♀ 13 ♂ ♂, 27-III-1989 (2 ♂ ♂: NSMT-Ar 2396), 1 ♂, 28-III-1989, 1 ♀ 1 ♂, 29-III-1989 (NSMT-Ar 2397), 1 ♀ 1 ♂, 25-XII-1989 (1 ♂: NSMT-Ar 2398), 1 ♀ 2 ♂ ♂, 1-I-1990, 2 ♀ ♀ 13 ♂ ♂, 29-IV-1990, 1 ♂, 30-IV-1990, 7 ♀ ♀ 5 ♂ ♂, 24-XII-1990, 6 ♀ ♀ 3 ♂ ♂, 25-XII-1990, 8 ♂ ♂, 26-XII-1990, 6 ♀ ♀ 3 ♂ ♂, 27-XII-1990, 6 ♀ ♀ 12 ♂ ♂, 3-I-1991, 5 ♀ ♀ 5 ♂ ♂, 4-I-1991, 1 ♀ 2 ♂ ♂, 7-I-1991, Iriomotejima Island, Okinawa Pref., A. TANIKAWA leg.; 2 ♀ ♀ 1 ♂, same locality, 13-VIII-1985, N. TANAKA leg.; 3 ♀ ♀, Haterumajima Island, Okinawa Pref., 31-X-1987, N. TANAKA leg. (NSMT-Ar 2399); 1 ♀, Yonagunijima Island, Okinawa Pref., 2-XI-1987, N. TANAKA leg.; 12 ♀ ♀, Tharawaddy, Burma, OATES leg. (BMNH BM1895.9.21.631-40, part., females); 3 ♀ ♀ 1 juv. (WORKMAN's collection, NMI 521, 603, 836).

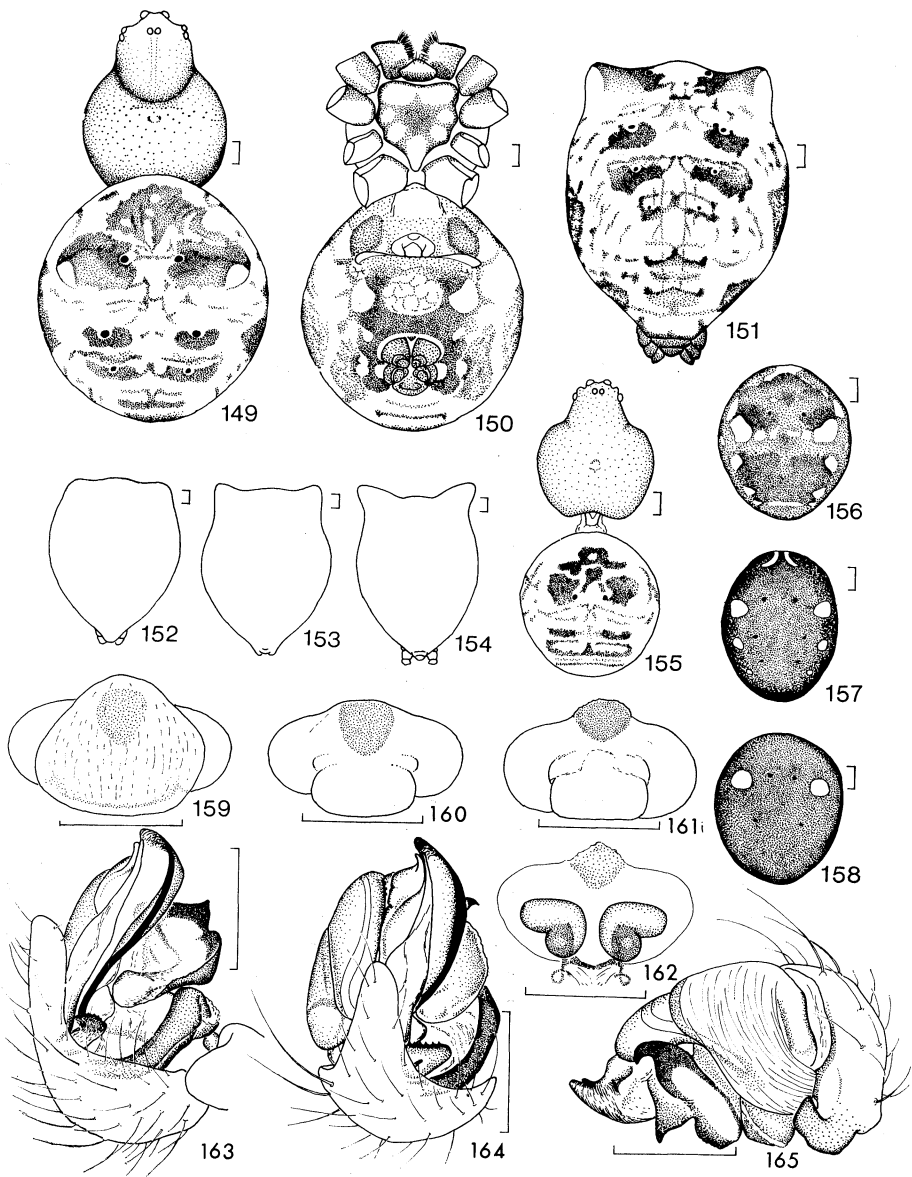
Description. Measurement (in mm). Body length ♀ 3.42-5.00, ♂ 2.60-3.13; carapace length ♀ 1.44-1.70, ♂ 1.36-1.53, width ♀ 1.17-1.47, ♂ 1.08-1.23; abdomen length ♀ 2.00-3.03, ♂ 1.34-1.76, width ♀ 1.87-2.87, ♂ 1.13-1.44. Length of legs of 1 ♀ 1 ♂ from Iriomotejima Island as shown in Table 14.

Table 14. Measurement of leg segments of *Cyclosa mulmeinensis* (THORELL, 1887) (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.50/0.47	0.93/0.84	0.95/0.91	0.70/0.56	1.43/1.34	4.51/4.12
II	0.48/0.45	0.84/0.74	0.77/0.65	0.67/0.52	1.28/1.19	4.04/3.55
III	0.36/0.34	0.52/0.45	0.44/0.36	0.44/0.33	0.85/0.78	2.61/2.26
IV	0.47/0.42	1.01/0.75	0.79/0.70	0.58/0.45	1.34/1.23	4.19/3.55

Female. Carapace length/width 1.15-1.23; MOA length/width 0.97-1.06, anterior width/posterior width 1.13-1.44. Chelicera with 3 promarginal and 2-3 retromarginal teeth. Labium length/width 0.54-0.64; sternum length/width 1.07-1.13. Length of leg 1/carapace 2.74-2.85. Abdomen length/width 1.04-1.10, globular, with a pair of dorsal protuberances (sometimes indistinct) (Figs. 151-154). Female genitalia (Figs. 159-162): scape of epigynum conchiform (Fig. 159); internal genitalia as shown in Fig. 162.

Male. Carapace length/width 1.22-1.28; MOA length/width 0.91-1.07, anterior width/posterior width 1.32-1.48. Chelicera with 3 promarginal and 2-3 retromarginal teeth. Labium length/width 0.48-0.56; sternum length/width 1.03-1.18. Length of leg 1/carapace 2.76-2.89. Male palp (Figs. 163-165): median apophysis with a large triangular appendix (Figs. 163, 165); embolus filiform



Figs. 149–165. *Cyclosa mulmeinensis* (THORELL, 1887). — 149. Cephalothorax and abdomen of female, dorsal view. 150. Same, ventral view. 151–154. Female abdomen, hind view. 155. Cephalothorax and abdomen of male, dorsal view. 156–158. Abdomen of male, dorsal view. 159. Epigynum with scape. 160–161. Same, without scape. 162. Female genitalia, dorsal view. 163. Male palp, prolateral view. 164. Same, axial view. 165. Same, retrolateral view. (Scales: 0.25 mm.)

(Fig. 163), wrapped in an edge of conductor; paramedian apophysis visible in prolateral view (Fig. 163). Abdomen length/width 1.08–1.22, globular or oval (Figs. 155–158).

Coloration and markings. Female. Carapace dark brown, anteriorly often paler (Fig. 149). Abdomen pale brown, mottled with dark brown (Figs. 149, 151).

Male. Carapace dark brown (Fig. 155). Abdomen somewhat varied; pale brown mottled with dark brown (Fig. 155); dark brown, mottled with black and white (Fig. 156); or blackish brown, with paired white spots (Figs. 157–158).

Range. Africa to East Asia (Japan, Taiwan).

Remarks. This species resembles *C. vallata* (KEYSERLING, 1886). As for the discrimination, see the remarks of *C. vallata*.

Cyclosa vallata (KEYSERLING, 1886)

[Japanese name: Maru-gomigumo]

(Figs. 166–181)

Epeira vallata KEYSERLING, 1886, Arachn. Austral., 2, p. 149, pl. 12, fig. 5.

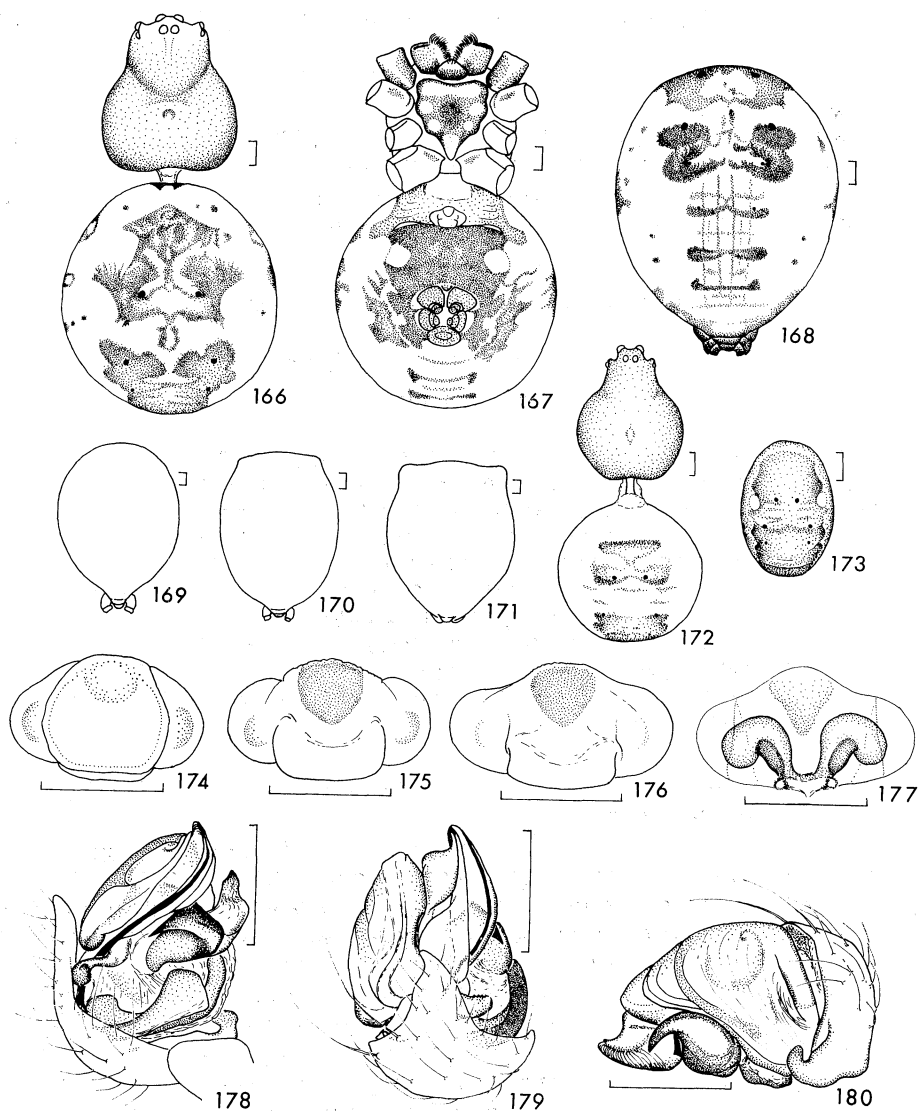
Cyclosa vallata: BÖSENBERG & STRAND, 1906, Abh. senkenb. naturf. Ges., 30: 203, pl. 15, fig. 411. — ROEWER, 1942, Kat. Aran., 1: 758. — BONNET, 1956, Bibl. Aran., 2: 1325. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 68, pl. 31, fig. 172; 1970, Bull. natn. Sci. Mus., Tokyo, 13: 659; 1977, Acta arachnol., 27 (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 4. — CHRYSANTHUS, 1971, Zool. Verh., 113: 23, 25, figs. 40–41, 117–119. — ZHU, 1983, J. Bethune med. Univ., 9 (spec. no.): 30. — PAIK & KIM, 1985, Korean Arachnol., 1: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 334. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 85, 219, fig. 72. — TANIKAWA, 1990, Atypus, (96): 2, figs. 1–15. — KIM, 1991, Korean Arachnol., 6: 282.

Specimens examined. Type series. Syntypes: 11 ♀♀, Rhockhampton, Queensland, Australia (ZMH).

Other Specimens examined. 1 ♀ 1 ♂, Manazuru, Ashigarashimo-gun, Kanagawa Pref., S. INABA leg. (NSMT–Ar 2400); 2 ♀♀, 17–VIII–1989 (NSMT–Ar 2401), 1 ♀ 1 ♂, 6–IX–1989 (NSMT–Ar 2402), same locality, A. TANIKAWA leg.; 16 ♀♀ 1 ♂, Kushimoto-chô, Nishimuro-gun, Wakayama Pref., 31–VIII–1990, A. TANIKAWA leg.; 1 ♀, Tanjô, Mihama-chô, Mikata-gun, Fukui Pref., 27–VII–1980, T. KAMURA leg.; 1 ♀, Ueno, Tango-chô, Takeno-gun, Kyoto Pref., 28–30–VIII–1979, T. KAMURA leg.; 11 ♀♀ 1 ♂, Tottorisakyû, Tottori-shi, Tottori Pref., 31–VIII–1991, A. TANIKAWA leg.; 1 ♀, Kokubunji-chô, Ayauta-gun, Kagawa Pref., 3–X–1990, A. TANIKAWA leg. (NSMT–Ar 2403); 1 ♀, Yoshihara, Kochi Pref., 10–VIII–1953, T. YAGINUMA leg. (NSMT–Ar 247); 1 ♀, Kyushu Univ., Fukuoka-shi, Fukuoka Pref., 6–X–1954, C. OKUMA leg.; 1 ♀ 1 ♂, Miyazaki, Miyazaki-shi, Miyazaki Pref., 18–VIII–1989, K. KUMADA leg. (NSMT–Ar 2404); 3 ♀♀, 14–VII–1990, 3 ♀♀, 15–VII–1990, 7 ♀♀ 5 ♂♂, 16–VII–1990 (2 ♀♀ 2 ♂♂: NSMT–Ar 2405), Yakushima Island, Kagoshima Pref., A. TANIKAWA leg.

Description. Measurement (in mm). Body length ♀ 3.42–5.53, ♂ 2.40–3.27; carapace length ♀ 1.41–2.02, ♂ 1.31–1.65, width ♀ 1.16–1.63, ♂ 1.02–

1.28; abdomen length ♀ 1.97–3.30, ♂ 1.16–1.65; width ♀ 1.84–3.03, ♂ 0.78–1.58. Length of legs of 1 ♀ from Kanagawa Pref. and 1 ♂ from Miyazaki Pref.



Figs. 166–180. *Cyclosa vallata* KEYSERLING, 1886. — 166. Cephalothorax and abdomen of female, dorsal view. 167. Same, ventral view. 168–171. Female abdomen, hind view. 172. Cephalothorax and abdomen of male, dorsal view. 173. Abdomen of male, dorsal view. 174. Epigynum with scape. 175–176. Same, without scape. 177. Female genitalia, dorsal view. 178. Male palp, prolateral view. 179. Same, axial view. 180. Same, retrolateral view. (Scales: 0.25 mm.)

as shown in Table 15.

Female. Carapace length/width 1.20–1.27; MOA length/width 0.95–1.06, anterior width/posterior width 1.27–1.50. Chelicera with 3 promarginal and 2 retromarginal teeth. Labium length/width 0.61–0.70; sternum length/width 1.15–1.20. Length of leg 1/carapace 2.80–2.99. Abdomen length/width 1.07–1.10,

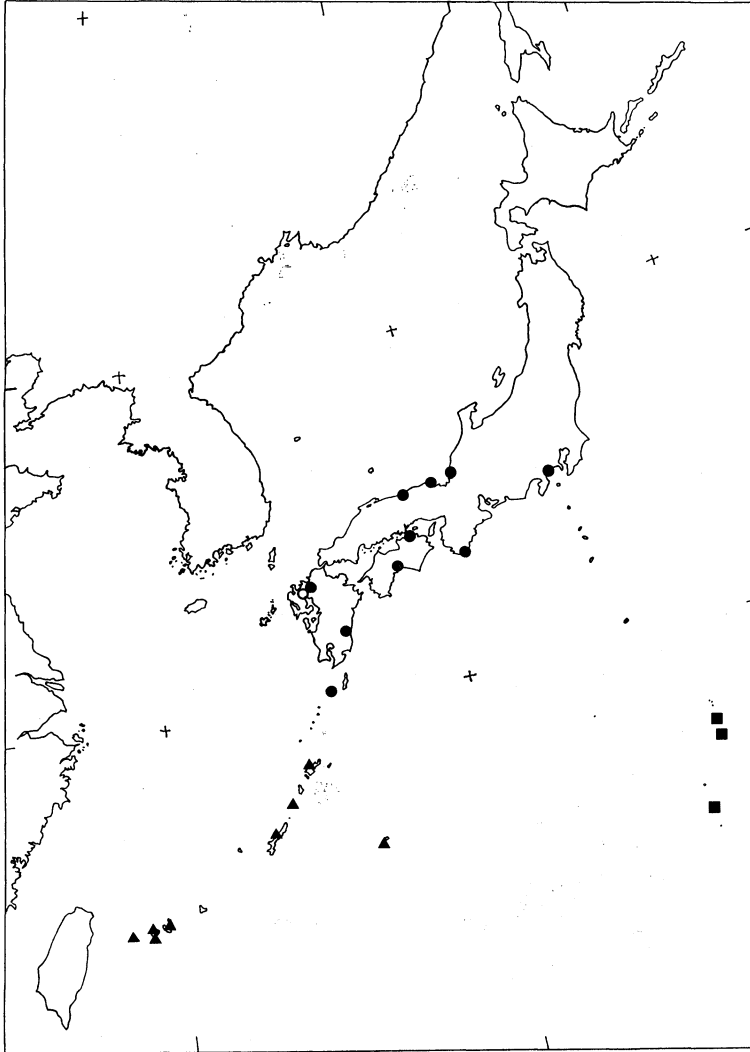


Fig. 181. Distribution of *Cyclosa maritima* sp. nov., *Cyclosa psylla* (THORELL, 1887), *Cyclosa mulmeinensis* (THORELL, 1887) and *Cyclosa vallata* KEYSERLING, 1886, in Japan, based on the specimens examined in this study. ■: *C. maritima*; ○: *C. psylla*; ▲: *C. mulmeinensis*; ○: *C. vallata*.

Table 15. Measurement of leg segments of *Cyclosa vallata* (KEYSERLING, 1886)
(in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.50/0.47	0.89/0.81	0.94/0.86	0.69/0.51	1.44/1.34	4.46/3.99
II	0.48/0.44	0.84/0.71	0.77/0.59	0.67/0.48	1.36/1.13	4.12/3.35
III	0.39/0.33	0.48/0.41	0.42/0.35	0.45/0.33	0.84/0.70	2.58/2.12
IV	0.48/0.39	0.91/0.73	0.75/0.70	0.59/0.44	1.41/1.19	4.14/3.45

globular, sometimes with a pair of dorsal tubercles (Figs. 168–171). Female genitalia (Figs. 174–177): scape of epigynum conchiform (Fig. 174), internal genitalia as shown in Figs. 177.

Male. Carapace length/width 1.29–1.34; MOA length/width 0.85–1.03, anterior width/posterior width 1.20–1.55. Chelicera with 3 promarginal and 2 retromarginal teeth. Labium length/width 0.47–0.53; sternum length/width 1.18–1.29. Length of leg 1/carapace 2.69–2.82, retrolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 178–180): median apophysis with a large appendix folded over (Fig. 178); embolus filiform, wrapped in an edge of conductor (Fig. 178); paramedian apophysis visible in prolateral view (Fig. 178). Abdomen length/width 0.96–1.48, globular or oval (Figs. 172–173).

Coloration and markings. Female. Carapace dark brown, anteriorly paler (Fig. 166). Abdomen pale brown, mottled with dark brown (Figs. 166, 168).

Male. Carapace dark brown. Abdomen brown to dark brown, mottled with dark brown or blackish brown (Fig. 172), sometimes with paired white spots (Fig. 173).

Range. Japan, Korea, Taiwan, New Guinea, Australia.

Remarks. This species resembles *C. mulmeinensis* (THORELL, 1887), but can be distinguished from the latter by the following points. Female: barely distinguished by the shape of spermatheca (Figs. 162, 177); the spermatheca of this species is strongly recurved in dorsal view (Fig. 177). Male: palpal median apophysis of this species is provided with a large appendix folded (Figs. 178, 180), but that of *C. mulmeinensis* is provided with a triangular appendix not folded (Figs. 163, 165).

Cyclosa sachikoeae sp. nov.

[Japanese name: Mitsukado-gomigumo]

(Figs. 182–189, 231)

Specimens examined. Type series. Holotype: ♂, Komi, Iriomotejima Island, Okinawa Pref., 1–IV–1985, A. TANIKAWA leg. (NSMT–Ar 2406). Paratypes: 2♂♂, same data as for the holotype (NSMT–Ar 2407). 1♂, Urauchi, Iriomotejima Island, 1–IV–1987 (NSMT–Ar 2408), 1♂, Shirahama, Iriomotejima Island, 31–III–1988 (NSMT–Ar 2409), 2♀♀, Tsukigahama, Iriomotejima Island, 29–XII–1989 (NSMT–Ar 2410), 1♀, Komi–Ōtomi, Iriomotejima Island, 30–XII–1989 (NSMT–Ar 2411), 2♀♀, Komi, Iriomotejima Island, 1–V–1990 (NSMT–Ar 2412), A. TANIKAWA leg.

Other specimens examined. 1♀, Amami-ôshima Island, Kagoshima Pref., 27-VIII-1989, M. SADAMOTO leg.; 1♀, 31-III-1983, 2♀♀, 1-IV-1983, 1♀, 2-IV-1983, 1♀, 29-III-1985, 1♀, 1-IV-1985, 1♀, 11-VIII-1985, 1♂, 3-I-1986, 1♀, 28-XII-1986, 1♀, 1-IV-1988, 1♀, 30-III-1989, 2♀♀, 27-XII-1989, 2♀♀, 29-XII-1989, 5♀♀, 29-IV-1990, 1♂, 25-XII-1990, 1♂, 2-I-1991, Iriomotejima Island, Okinawa Pref., A. TANIKAWA leg.

Specimens examined for comparison. *Cyclosa quinqueguttata* (THORELL, 1881): holotype, ♂, Tharawaddy, Burma, OATES leg. (BMNH, BM1895.9.21.644. Figs. 194-197); 14♀♀, Tharawaddy, Burma, OATES leg. (BMNH, BM1895.9.21.620-30. labeled *C. hybophora*, which was synonymized with *C. quinqueguttata* by M. J. ROBERTS, 1983. Figs. 190-193).

Description. Measurement (in mm). Body length ♀ 3.88-5.37, ♂ 2.38-2.69; carapace length 1♀ 1.43-1.86, ♂ 1.33-1.42, width ♀ 1.17-1.52, ♂ 1.03-1.19; abdomen length ♀ 2.19-2.38, ♂ 1.19-1.33, width ♀ 1.81-2.76, ♂ 0.67-1.05. Length of legs of the paratype 1♀ from Iriomotejima Island and the holotype ♂ as shown in Table 16.

Table 16. Measurement of leg segments of *Cyclosa sachikoe* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.53/0.40	0.95/0.68	0.99/0.70	0.72/0.45	1.53/1.12	4.72/3.35
II	0.49/0.37	0.84/0.64	0.80/0.56	0.70/0.45	1.38/1.02	4.21/3.04
III	0.39/0.30	0.53/0.38	0.43/0.33	0.45/0.27	0.90/0.63	2.70/1.91
IV	0.47/0.38	0.93/0.70	0.88/0.67	0.63/0.39	1.50/1.11	4.41/3.25

Female. Carapace length/width 1.21-1.29; MOA length/width 1.03-1.09, anterior width/posterior width 1.31-1.43. Chelicera with 3 promarginal and 2 retromarginal teeth. Labium length/width 0.58-0.68; sternum length/width 1.12-1.22. Length of leg 1/carapace 2.73-2.95. Abdomen length/width 1.18-1.29; anteriorly with a pair of dorsal tubercles (Fig. 183), and with a protuberance at the posterior end (Figs. 182-183). Female genitalia (Figs. 184-185): scape of epigynum longer than wide (Fig. 184); internal genitalia as shown in Fig. 185.

Male. Carapace length/width 1.19-1.29; MOA length/width 0.98-1.04, anterior width/posterior width 1.37-1.50. Chelicera with 2-3 teeth on both margin. Labium length/width 0.53-0.62; sternum length/width 1.11-1.20. Length of leg 1/carapace 2.38-2.59; retrolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 187-189): median apophysis with two small teeth at apical part and at about the middle (Fig. 188); embolus filiform, wrapped in an edge of conductor (Fig. 188); paramedian apophysis visible in prolateral view (Fig. 188). Abdomen length/width 1.27-1.77, oval (Fig. 186).

Coloration and markings. Female. Carapace dark brown, anteriorly sometimes paler (Fig. 182). Abdomen pale brown, mottled with dark brown and white (Fig. 182).

Male. Carapace dark brown (Fig. 186). Abdomen dark gray, with black marking and several white spots (Fig. 186).

Range. Japan.

Remarks. This species resembles *C. camelodes* (THORELL, 1878) and *C. quinqueguttata* (THORELL, 1881). The distinction from *C. camelodes* is as

follows. Female: the epigynal scape (Figs. 145, 184), is shorter and thicker than that of *C. camelodes* (variable in *C. camelodes*). Male: palpal median apophysis is provided with two teeth at apical part and at the middle (Fig. 188), but that of *C. camelodes* is provided with only one tooth at the middle. The distinction from *C. quinqueguttata* is as follows. Female: posterior end of abdomen is not bifurcated (Fig. 183), but that of *C. quinqueguttata* is vertically bifurcated (sometimes indistinct) (Figs. 191–192). Male: palpal median apophysis is provided with two teeth, at distal part and at the middle as in Fig. 188, that of *C. quinqueguttata* is also provided with two teeth, the first tooth is at distal part as in *C. sachikoe*, but the second teeth is situated more proximally (Fig. 195), the shape of distal part of palpal cymbium is also different (Figs. 189, 197).

Etymology. Named after Ms. Sachiko TAZOE, Yokohama.

Cyclosa alba sp. nov.

[Japanese name: Shiro-gomigumo]

(Figs. 198–201, 231)

Specimens examined. Type series. Holotype: ♀, 27–XII–1989, Iriomote-jima Island, Okinawa Pref., A. TANIKAWA leg. (NSMT–Ar 2413). Paratypes: 1 ♀, Miyakejima Island, Tokyo, 3–VIII–1977, K. SUZUKI leg. (NSMT–Ar 2414); 1 ♀, Konpira, Mitoyo-gun, Kagawa Pref., 4–VIII–1988, K. KUMADA leg. (NSMT–Ar 2415); 1 ♀, 2–I–1986 (NSMT–Ar 2416), 1 ♀, 30–XII–1986 (NSMT–Ar 2417), 3 ♀ ♀, 28–III–1987 (NSMT–Ar 2418), 1 ♀, 24–XII–1989 (NSMT–Ar 2419), same locality and collector as for the holotype.

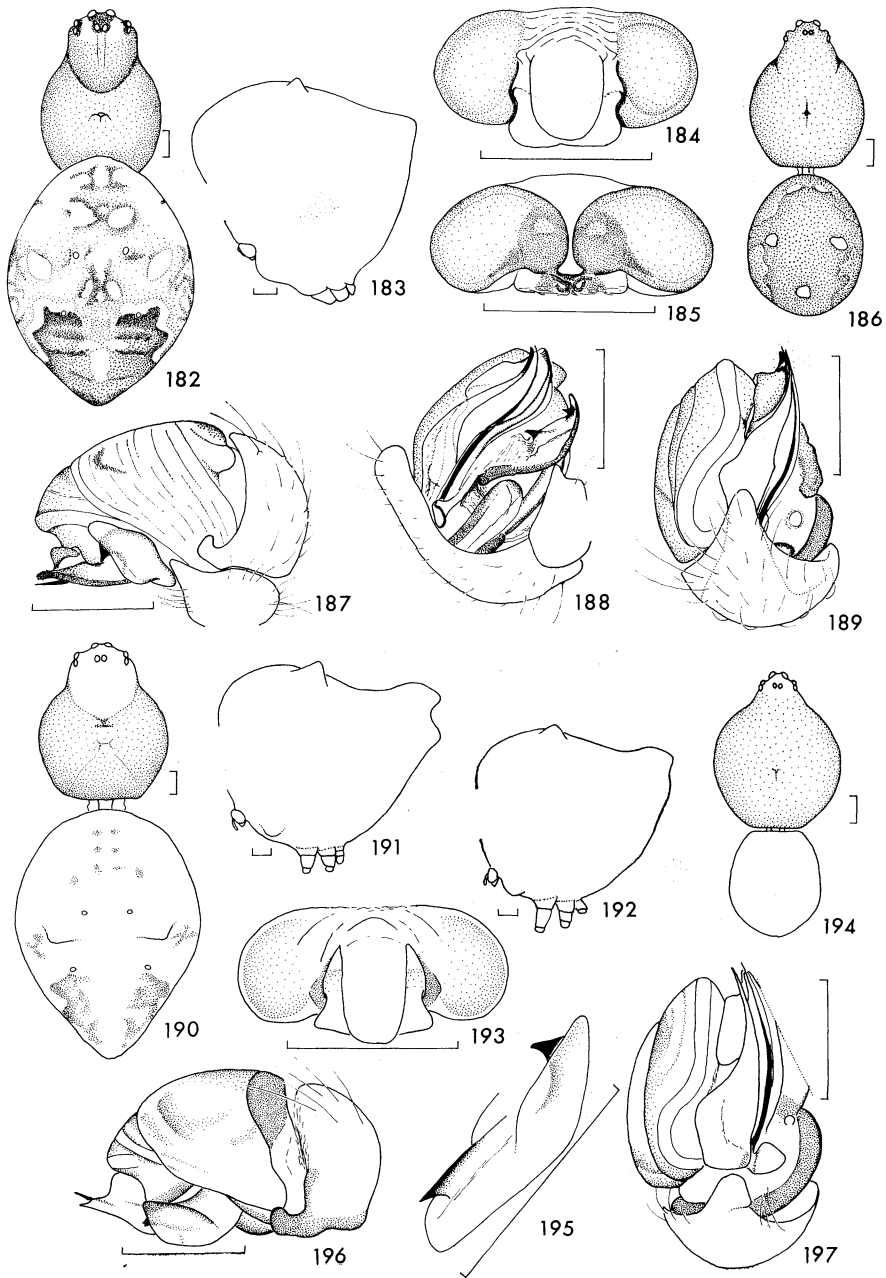
Specimens examined for comparison. *Cyclosa oatesi* (THORELL, 1892): syntypes, 2 ♀ ♀ 1 ♂, Tabb Island, Andaman Islands, OATES leg. (BMNH, BM1895.10.20.4–6. Figs. 202–210).

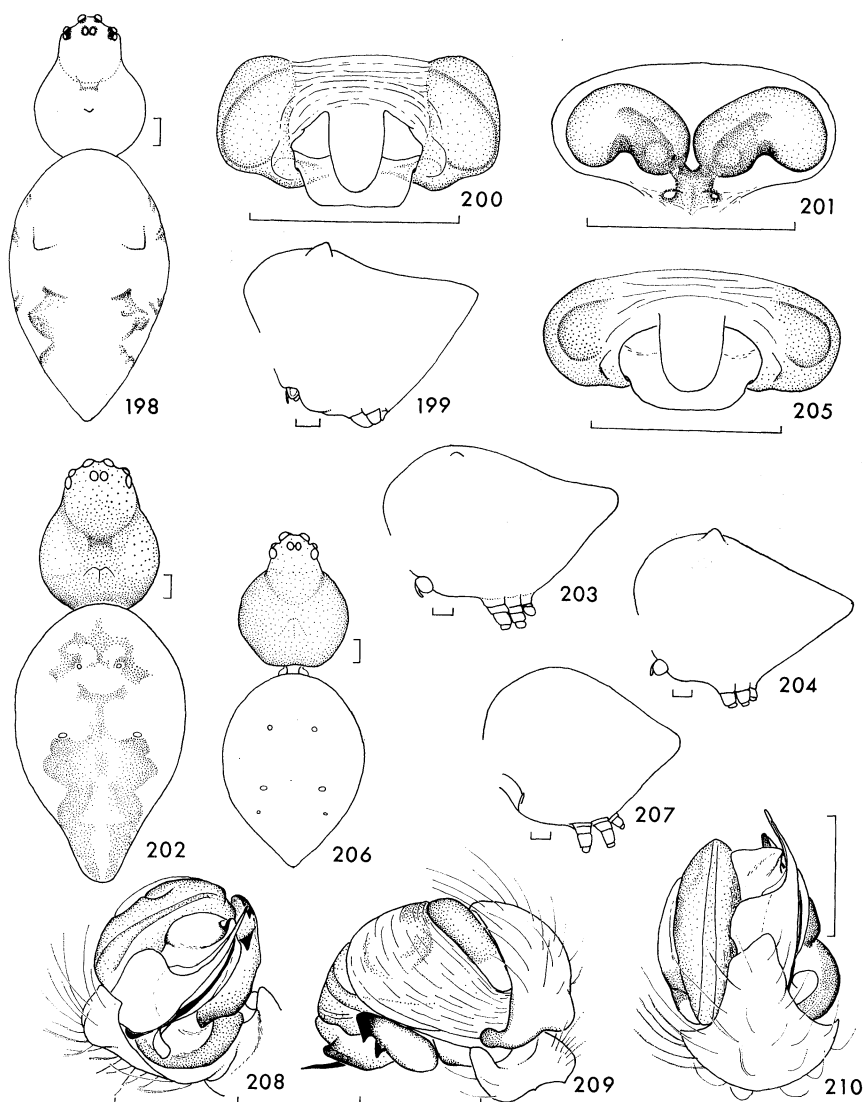
Description. Measurement (in mm). Body length ♀ 3.40–4.50; carapace length ♀ 1.06–1.36, width ♀ 0.91–1.08; abdomen length ♀ 2.00–3.07, width ♀ 1.27–1.90. Length of legs of the holotype ♀ as shown in Table 17.

Female. Carapace length/width 1.17–1.28; MOA length/width 1.00–1.11, anterior width/posterior width 1.20–1.36. Chelicera with 3 promarginal and 2–3 retromarginal teeth. Labium length/width 0.63–0.71, sternum length/width 1.12–1.23. Length of leg 1/carapace 2.69–2.98. Abdomen length/width 1.56–1.61,

Figs. 182–197. 182–189. *Cyclosa sachikoe* sp. nov. — 182. Cephalothorax and abdomen of female, dorsal view. 183. Female abdomen, lateral view. 184. Epigynum. 185. Female genitalia, dorsal view. 186. Cephalothorax and abdomen of male, dorsal view. 187. Male palp, retrolateral view. 188. Same, prolateral view. 189. Same, axial view. 190–197. *Cyclosa quinqueguttata* (THORELL, 1881) (male, holotype, BMNH, BM1895.9.21.644; female, BMNH, BM1895.9.21.620–30). — 190. Cephalothorax and abdomen of female, dorsal view. 191–192. Female abdomen, lateral view. 193. Epigynum. 194. Cephalothorax and abdomen of male, dorsal view. 195. Median apophysis of male palp, prolateral view. 196. Male palp, retrolateral view. 197. Same, axial view. (Scaels: 0.25 mm.)

anteriorly with a pair of dorsal tubercles, posteriorly conical and caudal end pointed (Figs. 198–199). Female genitalia (Figs. 200–201): scape of epigynum longer than wide (Fig. 200); internal genitalia as shown in Fig. 201.





Figs. 198–210. 198–201. *Cyclosa alba* sp. nov. — 198. Cephalothorax and abdomen of female, dorsal view. 199. Female abdomen, lateral view. 200. Epigynum. 201. Female genitalia, dorsal view. 202–210. *Cyclosa oatesi* THORELL, 1892 (syntypes, BMNH, BM1895.10.20.4–6). — 202. Cephalothorax and abdomen of female, dorsal view. 203–204. Female abdomen, lateral view. 205. Epigynum. 206. Cephalothorax and abdomen of male, dorsal view. 207. Male abdomen, lateral view. 208. Male palp. 209. Same, retrolateral view. 210. Same, axial view. (Scales: 0.25 mm.)

Table 17. Measurement of leg segments of *Cyclosa alba* sp. nov. (in mm; ♀).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.38	0.59	0.64	0.48	1.08	3.17
II	0.33	0.52	0.52	0.47	0.89	2.73
III	0.28	0.34	0.29	0.32	0.59	1.82
IV	0.33	0.55	0.55	0.41	0.94	2.78

Coloration and markings. Female. Carapace pale yellow. Abdomen pale yellow with a pair of dark clouded zigzag markings on posterior half (Fig. 198).

Male unknown.

Range. Japan.

Remarks. This species very closely resembles *C. oatesi* (THORELL, 1892), but can be distinguished from the latter by the following points: carapace of *C. alba* is pale yellow (Fig. 198), lightly sclerotized and semitransparent, but that of *C. oatesi* is brown (Fig. 202), more sclerotized; *C. alba* is slightly smaller than *C. oatesi* in total length (*C. alba* 3.40–4.50 mm, *C. oatesi* 4.55–4.65 mm), in carapace length and width, *C. alba* is distinctly smaller than *C. oatesi* (*C. alba* 1.06–1.36 mm long, 0.91–1.08 mm wide, *C. oatesi* 1.62–1.63 mm long, 1.28–1.30 mm wide). This species also resembles *C. neilensis* TIKADER, 1977, but can be distinguished from the latter by the shape of epigynal scape linguiform and without hairs (Fig. 200); in *C. neilensis*, it is acute-angled triangle and provided with hairs.

Etymology. Specific name is due to the colour of body.

Cyclosa argenteoalba BÖSENBERG et STRAND, 1906

[Japanese name: Ginmekki-gomigumo]

(Figs. 211–221, 231)

Cyclosa argenteoalba BÖSENBERG et STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 202, pl. 4, fig. 38, pl. 15, fig. 419. — ROEWER, 1942, Kat. Aran., **1**: 752. — BONNET, 1956, Bibl. Aran., **2**: 1308. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 68, pl. 31, fig. 170; 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 658; 1977, Acta arachnol., **27** (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 2. — PAIK & KIM, 1985, Korean Arachnol., **1**: 63. — ZHU, 1983, J. Bethune med. Univ., **9** (spec. no.): 28. — PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 86, 219, fig. 73. — KIM, 1991, Korean Arachnol., **6**: 282.

Specimens examined. Type series. Holotype: ♀, "Yunohama Berge," Saga, 1882, W. DÖNITZ leg. (SMF 3642).

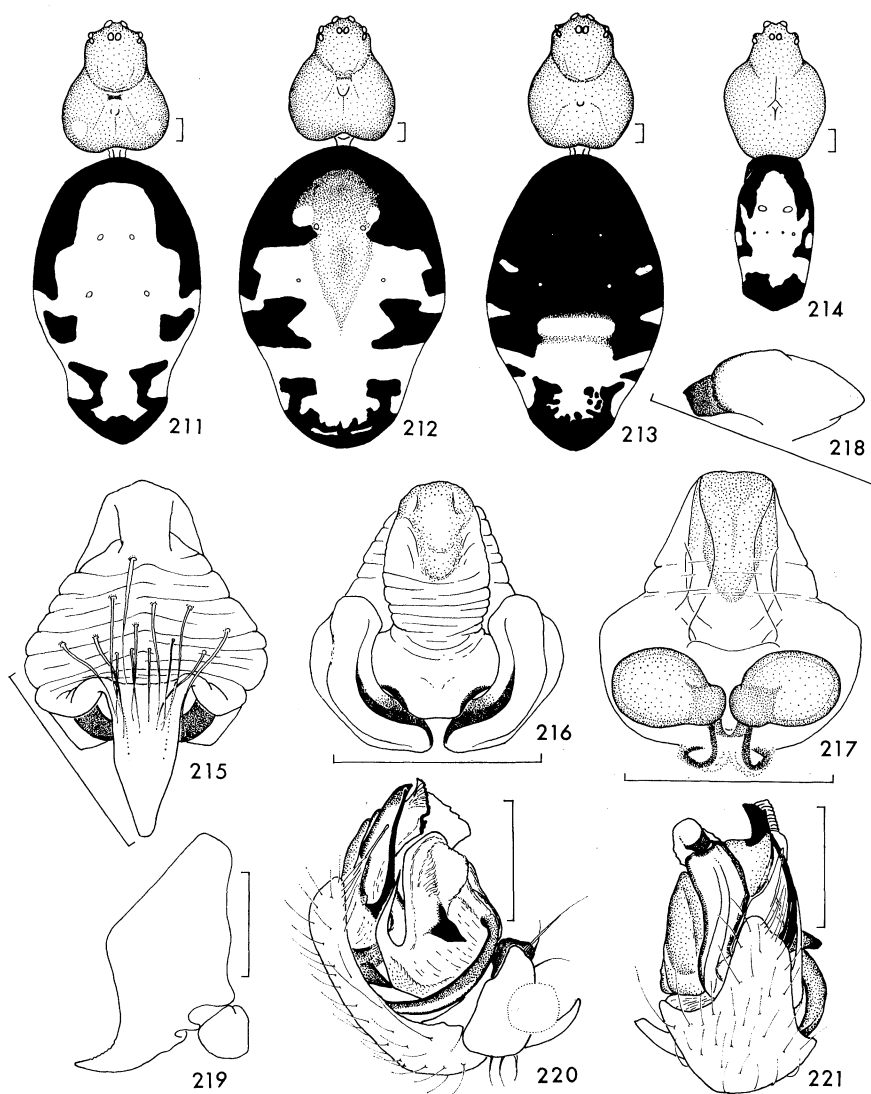
Other specimens examined. 1 ♀, Mt. Nakimushiyama, Nikkô-shi, Tochigi Pref., 14–VIII–1990, A. TANIKAWA leg.; 2 ♀ ♀ 1 ♂, Utsunomiya-shinrinkôen, Utsunomiya-shi, Tochigi Pref., 12–VIII–1990, A. TANIKAWA leg.; 7 ♀ ♀ 1 ♂, Mt. Takiyama, Utsunomiya-shi, Tochigi Pref., 14–VIII–1990, A. TANIKAWA leg. (1 ♂: NSMT-Ar 2420); 1 ♀, Mt. Tsukuba, Tsukuba-shi, Ibaragi Pref., 15–IX–1980, A. TANIKAWA leg. (NSMT-Ar 2421); 4 ♀ ♀ 2 ♂ ♂, 19–V–1991, 1 ♀ 4 ♂ ♂,

14-VII-1991, Kinchakuden, Hidaka-chô, Saitama Pref., A. TANIKAWA leg.; 1 ♀, Hachiôji-jôshi, Hachiôji-shi, Tokyo, 25-VII-1991, K. KUMADA leg.; 5 ♀♀, 10-VI-1990 (NSMT-Ar 2422), 1 ♀, 23-VIII-1990, Nozuda, Machida-shi, Tokyo, A. TANIKAWA leg.; 1 ♀, Minenoyakushi, Tukai-gun, Kanagawa Pref., 3-VI-1990, A. TANIKAWA leg.; 1 ♀, Katakura-chô, Yokohama-shi, Kanagawa Pref., 15-V-1991, M. KUMADA leg.; 1 ♀, Noba-chô, Yokohama-shi, Kanagawa Pref., 28-V-1990, A. TANIKAWA leg.; 1 ♂, Jinmuji, Zushi-shi, Kanagawa Pref., 20-V-1990, A. TANIKAWA leg. (NSMT-Ar 2423); 1 ♂, Fudakake, Tanzawa, Kanagawa Pref., 12-VIII-1972, K. KUMADA leg. (NSMT-Ar 2425); 3 ♀♀, Ôkura, Tanzawa, Kanagawa Pref., 17-V-1987, A. TANIKAWA leg.; 8 ♀♀, Mt. Kôbôyama, Hatano-shi, Kanagawa Pref., 15-IX-1989, A. TANIKAWA leg. (7 ♀♀: NSMT-Ar 2424); 1 ♀, 19-IX-1990, 1 ♀1 ♂, 1-V-1991, Kamiôi, Ashigarakami-gun, Kanagawa Pref., K. KUMADA leg.; 5 ♀♀, 6-IX-1989 (NSMT-Ar 2426), 6 ♀♀, 22-VIII-1990, Manazuru, Ashigarashimo-gun, Kanagawa Pref., A. TANIKAWA leg.; 1 ♀2 ♂♂, Mt. Yoshidayama, Kyoto Pref., 12-V-1990, A. SHINKAI leg. (NSMT-Ar 2427); 1 ♂, Kita-ku, Kyoto-shi, Kyoto Pref., 6-V-1990, T. HIRAMATSU leg. (NSMT-Ar 2430); 1 ♀, Mt. Yoshinoyama, Yoshino-gun, Nara Pref., 16-VIII-1968, T. YAGINUMA leg. (NSMT-Ar 242, labeled *C. japonica*); 2 ♀♀, 28-IX-1968, 1 ♀, 22-VIII-1986, Yoshino, Yoshino-gun, Nara Pref., H. TANAKA leg.; 1 ♀, Kaizan-chô, Owase-shi, Mie Pref., 21-VIII-1988, H. ONO leg.; 2 ♀♀, Kiwa-chô, Higashimuro-gun, Mie Pref., 3-VIII-1991, A. TANIKAWA leg.; 1 ♀, Wakanoura, Wakayama-shi, Wakayama Pref., 9-X-1977, H. TANAKA leg.; 17 ♀♀2 ♂♂, Kôyaguchi-chô, Ito-gun, Wakayama Pref., 28-VIII-1990, A. TANAKAWA leg. (1 ♂: NSMT-Ar 2428); 3 ♀♀, Kumanogawa-chô, Higashimuro-gun, Wakayama Pref., 3-VIII-1991, A. TANIKAWA leg.; 6 ♀♀1 ♂, 30-VIII-1990 (1 ♀1 ♂: NSMT-Ar 2429), 3 ♀♀1 ♂, 2-VIII-1991, Nachikatsuura-chô, Higashimuro-gun, Wakayama Pref., A. TANIKAWA leg.; 1 ♀, Segawa, Minô-shi, Osaka Pref., 21-V-1977, T. KAMURA leg.; 2 ♀♀, Tannan-chô, Taki-gun, Hyogo Pref., 6-VIII-1968, H. TANAKA leg.; 1 ♀, Mochigase-chô, Yazu-gun, Tottori Pref., 1-IX-1991, A. TANIKAWA leg.; 3 ♀♀, 2-X-1990, 5 ♀♀, 25-VIII-1991, Okuichi, Okayama-shi, Okayama Pref., A. TANIKAWA leg.; 3 ♀♀, Kamiachi, Okayama-shi, Okayama Pref., 25-VIII-1991, A. TANIKAWA leg.; 11 ♀♀1 ♂, Higashitaichi, Tamano-shi, Okayama Pref., 26-VIII-1991, A. TANIKAWA leg.; 1 ♀, Mihonoseki-chô, Yatsuka-gun, Shimane Pref., 2-IX-1991, K. KUMADA leg.; 2 ♀♀1 ♂, Kiyomizu-chô, Yasugi-shi, Shimane Pref., 2-IX-1991, K. KUMADA leg.; 1 ♀1 ♂, Hamadajôshi, Hamada-shi, Shimane Pref., 2-IX-1991, T. HIRAMATSU leg.; 4 ♀♀, Kokubunji-chô, Ayauta-gun, Kagawa Pref., 3-X-1990, A. TANIKAWA leg.; 1 ♀, Mt. Tachibanayama, Fukuoka-shi, Fukuoka Pref., 24-VIII-1991, A. TANIKAWA leg.; 1 ♀, Yoshimuta, Kamimashiri-gun, Kumamoto Pref., 14-VIII-1990, S. TAZOE leg.; 2 ♀♀, Shîba, Higashiusuki-gun, Miyazaki Pref., 6~7-VIII-1961, C. OKUMA leg.; 1 ♀1 ♂, Tengzhi-shan, Taiwan, 1-XI-1989, H. ONO leg.

Description. Measurement (in mm). Body length ♀ 3.70–6.80, ♂ 2.84–3.60; carapace length ♀ 1.33–1.92, ♂ 1.38–1.71, width ♀ 1.07–1.54, ♂ 0.92–1.14; abdomen length ♀ 2.38–4.63, ♂ 1.45–1.92, width ♀ 1.53–2.83, ♂ 0.84–1.06. Length of legs of the holotype ♀ and 1 ♂ from Kanagawa Pref. as shown in Table 18.

Female. Carapace length/width 1.19–1.36; MOA length/width 0.92–1.00, anterior width/posterior width 1.13–1.39. Chelicera with 4 promarginal and 3

retromarginal teeth. Labium length/width 0.62–0.69; sternum length/width 1.03–1.15. Length of leg 1/carapace 3.10–3.47. Abdomen length/width 1.47–1.84. Female genitalia (Figs. 215–217): scape of epigynum wrinkled, as wide as



Figs. 211–221. *Cyclosa argenteoalba* BÖSENBERG et STRAND, 1906. — 211–213. Cephalothorax and abdomen of female, dorsal view. 214. Cephalothorax and abdomen of male, dorsal view. 215. Epigynum with scape. 216. Same, without scape. 217. Female genitalia, dorsal view. 218. Median apophysis of male palp (distal part). 219. Male palpal cymbium, dorsal view. 220. Male palp, prolateral view. 221. Same, axial view. (Scales: 0.25 mm.)

Table 18. Measurement of leg segments of *Cyclosa argenteoalba* Börs. et STR., 1906 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.60/0.49	1.35/1.04	1.45/1.21	0.84/0.60	2.00/1.61	6.24/4.95
II	0.53/0.46	1.03/0.88	1.11/0.92	0.70/0.54	1.59/1.43	4.96/4.23
III	0.44/0.38	0.69/0.61	0.69/0.64	0.48/0.37	1.16/0.99	3.46/2.99
IV	0.53/0.46	1.13/1.01	1.20/1.02	0.65/0.47	1.69/1.41	5.20/4.37

epigynum (Fig. 215); internal genitalia as shown in Fig. 217.

Male. Carapace length/width 1.41–1.50; MOA length/width 0.82–0.94, anterior width/posterior width 1.42–1.60. Chelicera with 3–4 promarginal, 2–3 retromarginal teeth. Labium length/width 0.60–0.68; sternum length/width 1.15–1.29. Length of leg 1/carapace 3.01–3.17, retrolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 218–221): median apophysis distally flattened and truncated (Fig. 218), basally with a triangular appendix and spiniform lamella (Fig. 220); embolus spiniform (Fig. 220); terminal apophysis indistinct (Figs. 220–221); paramedian apophysis almost hidden in prolateral view (Fig. 220); cymbium caudally projecting, in dorsal view (Fig. 219). Abdomen length/width 1.62–2.05.

Coloration and markings. Female. Carapace dark brown. Abdomen somewhat varied (Figs. 211–213); silver with black markings, sometimes with a brown marking also.

Male. Carapace dark brown. Abdomen silver or dark gray, with black markings (Fig. 214).

Range. Japan, China, Korea, Taiwan.

Remarks. This species resembles *C. okumae* sp. nov., *C. ginnaga* YAGINUMA, 1959 and *C. kumadai* sp. nov., but can be easily distinguished from these three species by the following points. Female: the epigynal scape is as wide as epigynum (Fig. 215), while those of the others are narrower than epigynum (Figs. 223, 238, 250); the shape of epigynum is also quite different (Figs. 215–216, 223–225, 238–240, 250–252). Male: palpal median apophysis is distally flattened and truncated (Fig. 218), but those of *C. ginnaga* and *C. kumadai* are shaped otherwise (Figs. 230, 242–243, 254).

Cyclosa okumae sp. nov.

[Japanese name: Ōkuma-ginmekki-gomigumo]

(Figs. 222–231)

Specimens examined. Type series. Holotype: ♀, Mt. Tachibanayama, Fukuoka-shi, Fukuoka Pref., VIII–1953, C. OKUMA leg. (NSMT–Ar 2431). Paratypes: 1♂, 26–VI–1981 (NSMT–Ar 2453), 1♀, 23–VII–1981 (NSMT–Ar 2454), 1♀, 2–VII–1984 (NSMT–Ar 2455), Kamishihoro-chô, Katô-gun, Hokkaido, M. MATSUDA leg.

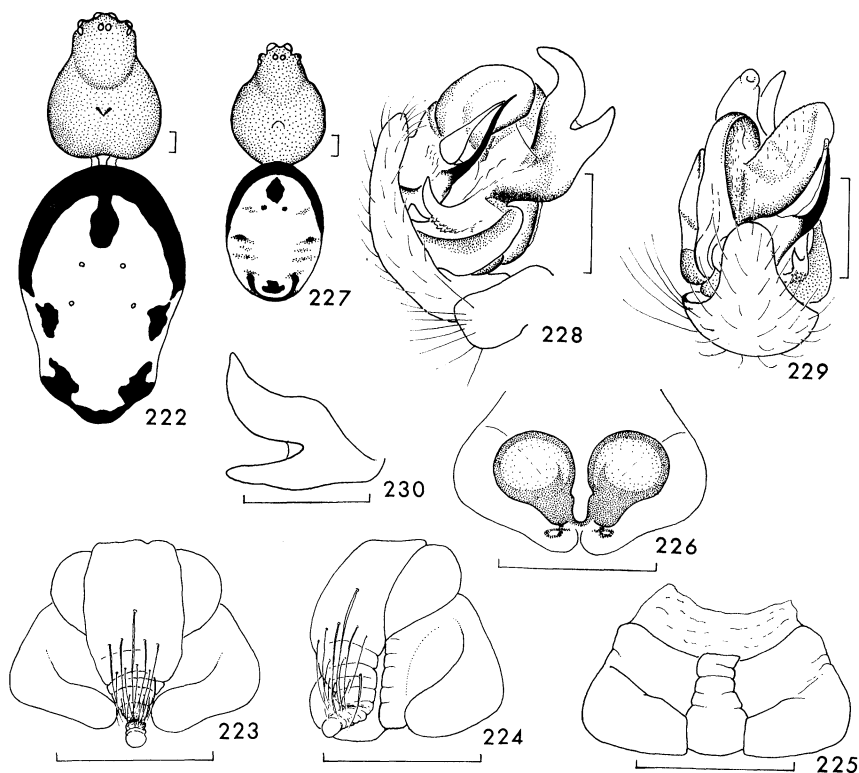
Description. Measurement (in mm). Body length ♀ 4.80–5.27, ♂ 3.27; carapace length ♀ 1.60–1.88, ♂ 1.55, width ♀ 1.23–1.50, ♂ 1.15; abdomen

length ♀ 3.30–3.68, ♂ 1.76, width ♀ 2.02–2.44, ♂ 0.80. Length of legs of the holotype ♀ and the paratype 1 ♂ as shown in Table 19.

Table 19. Measurement of leg segments of *Cyclosa okumae* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.58/0.56	1.20/1.25	1.34/1.29	0.78/0.61	1.90/1.75	5.80/5.46
II	0.57/0.55	1.10/1.04	1.16/1.05	0.73/0.55	1.73/1.55	5.29/4.74
III	0.50/0.42	0.72/0.61	0.73/0.62	0.52/0.40	1.16/1.04	3.63/3.09
IV	0.52/0.49	1.14/1.96	1.16/1.02	0.68/0.49	1.68/1.42	5.18/4.38

Female. Carapace length/width 1.25–1.31; MOA length/width 0.85–1.00, anterior width/posterior width 1.29–1.43. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length/width 0.69–0.71; sternum length/width 1.03–1.12. Length of leg 1/carapace 3.01–3.09. Abdomen length/width 1.51–1.66.



Figs. 222–230. *Cyclosa okumae* sp. nov. — 222. Cephalothorax and abdomen of female, dorsal view. 223–224. Epigynum with scape. 225. Same, without scape. 226. Female genitalia, dorsal view. 227. Cephalothorax and abdomen of male, dorsal view. 228. Male palp, prolateral view. 229. Same, axial view. 230. Median apophysis of male palp. (Scales: 0.25 mm.)

Female genitalia (Figs. 223–226): scape of epigynum single, but it looks like double structured (Figs. 223–224); internal genitalia as shown in Fig. 226.

Male. Carapace length/width 1.35; MOA length/width 0.63, anterior width/posterior width 1.58. Chelicera with 3 teeth on both margin. Labium length/width 0.56; sternum length/width 1.07. Length of leg 1/carapace 3.52. Male palp (Figs. 228–230): median apophysis large and V-shaped (Fig. 230),

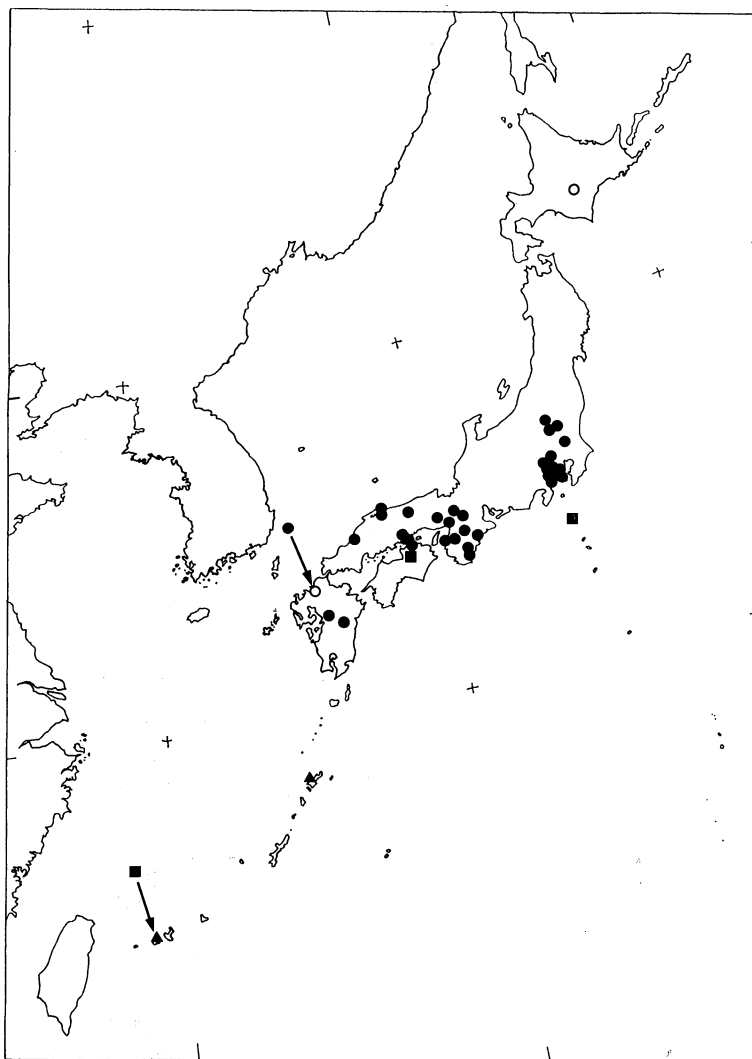


Fig. 231. Distribution of *Cyclosa sachikoe* sp. nov., *Cyclosa alba* sp. nov., *Cyclosa argenteoalba* BÖSENBERG et STRAND, 1906 and *Cyclosa okumae* sp. nov. in Japan, based on the specimens examined in this study. ▲: *C. sachikoe*; ■: *C. alba*; ●: *C. argenteoalba*; ○: *C. okumae*.

basally with a digitiform lamella (Fig. 228); embolus spiniform (Fig. 228); paramedian apophysis barely visible in prolateral view (Fig. 228). Abdomen length/width 1.41.

Coloration and markings. Female. Carapace dark brown. Abdomen silver with black markings (Fig. 222).

Male. Similar to female (Fig. 227).

Range. Japan.

Remarks. In general appearance, this species very closely resembles *C. argenteoalba* BÖSENBERG et STRAND, 1906, but can be easily distinguished from the latter by the following points. Female: epigynal scape is narrower than epigynum (Fig. 223), while that of *C. argenteoalba* is as wide as epigynum (Fig. 215). Even in the case of without scape, the shape of epigynum is quite different (Figs. 216, 225). Male: palpal median apophysis is large and V-shaped (Fig. 230), but that of *C. argenteoalba* is small and distally flattened but truncated (Fig. 218). This species also resembles *C. ginnaga* YAGINUMA, 1959 and *C. kumadai* sp. nov., but can be separated from the latter by the following points. Female: the scape of epigynum looks like double structured, but it is single indeed (Figs. 223–224); that of *C. ginnaga* is evidently single (Figs. 238–239); that of *C. kumadai* is evidently double structured (Figs. 250–251). Epigynum has sclerotized lobe and depression (Figs. 223–225); those of *C. ginnaga* and *C. kumadai* are without such lobe and depression (Figs. 238–240, 250–252). Male: the shape of palpal median apophysis is quite different from the others (Figs. 230, 242–243, 254).

Etymology. Named after Dr. Chiyoko OKUMA, Kyushu University.

Cyclosa ginnaga YAGINUMA, 1959

[Japanese name: Ginnaga-gomigumo]

(Figs. 232–246, 257)

Cyclosa ginnaga YAGINUMA, 1959, Bull. Osaka Mus. nat. Hist., **11**: 12, pl. 6, figs. 8–13. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 67, fig. 63, pl. 30, fig. 166; 1970, Bull. natn. Sci. Mus., Tokyo, **13**: 658; 1977, Acta arachnol., **27** (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 121, fig. 64, pl. 34, fig. 1. — BRIGNOLI, 1983, Cat. Aran., p. 265. — ZHU, 1983, J. Bethune med. Univ., **9** (spec. no.): 28. — PAIK & KIM, 1985, Korean Arachnol., **1**: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 333. — KIM, 1991, Korean Arachnol., **6**: 282.

Specimens examined. Type series. Holotype: ♀, labeled “30–VII–1951, Kogawaguchi, Tado, T. YAGINUMA leg.”; it is recorded as “30–VIII–1951, Ogawaguchi-Tado, Wakayama Pref., Osamu SAITO & Takeo YAGINUMA.” (OG) in the original description. Paratype: 1♀, same data as for the holotype (OG). Paratype was not designated in the original description.

Other specimens examined. 1♀, Amagi-yugashima, Tagata-gun, Shizuoka Pref., 31–VII–1982, K. KUMADA leg. (NSMT–Ar 2436); 13♀♀1♂, same locality, 21–VIII–1990, A. TANIKAWA leg. (3♀♀1♂: NSMT–Ar 2432); 23♀♀, Kiwachô, Minamimuro-gun, Mie Pref., 3–VIII–1991, A. TANIKAWA leg.; 4♀♀2♂♂, Tado, Totsukawa-mura, Nara Pref., 3–VIII–1991, A. TANIKAWA leg.; 5♀♀,

Ishigôchi, Koyu-gun, Miyazaki Pref., 22-VII-1960, C. OKUMA leg.; 1♀1♂, Nabetani, Miyakonojô-shi, Miyazaki Pref., 19-VII-1962, C. OKUMA leg.; 1♀, Takachihokyô, Nishiusuki-gun, Miyazaki Pref., 24-VII-1960, C. OKUMA leg.; 13♀♀, Shîba, Higashiusuki-gun, Miyazaki Pref., 6~7-VIII-1961, C. OKUMA leg.; 3♀♀, Mt. Kirishimayama, Aira-gun, Kagoshima Pref., 27-V-1971, H. TANAKA leg.; 8♀♀, 15-VII-1990, 17♀♀4♂♂, 17-VII-1990 (3♀♀2♂♂: NSMT-Ar 2433), Yakushima Island, Kumage-gun, Kagoshima Pref., A. TANIKAWA leg.; 10♀♀3♂♂, Yuwandake, Amami-ôshima Island, Kagoshima Pref., 24-VIII-1989, A. TANIKAWA leg. (10♀♀1♂: NSMT-Ar 2434); 1♂, Okinawa-jima Island, Okinawa Pref., 3-VI-1978, Y. CHIKUNI leg.; 2♀♀, same locality, 2-III-1990, H. ONO leg. (NSMT-Ar 2435).

Description. Measurement (in mm). Body length ♀ 5.00–10.25, ♂ 2.97–4.75; carapace length ♀ 1.73–2.38, ♂ 1.53–1.96, width ♀ 1.22–1.66, ♂ 1.08–1.39; abdomen length ♀ 3.33–7.75, ♂ 1.44–2.83, width ♀ 1.43–2.50, ♂ 0.88–1.91. Length of legs of 1♀1♂ from Amami-ôshima Island as shown in Table 20.

Table 20. Measurement of leg segments of *Cyclosa ginnaga* YAGINUMA, 1959 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.74/0.64	1.77/1.36	1.90/1.50	1.01/0.70	2.51/1.98	7.93/6.18
II	0.71/0.57	1.64/1.16	1.69/1.22	1.10/0.66	2.29/1.74	7.43/5.35
III	0.57/0.44	0.97/0.71	0.96/0.76	0.61/0.42	1.54/1.20	4.65/3.53
IV	0.64/0.53	1.63/1.14	1.73/1.24	0.83/0.54	2.39/1.70	7.22/5.15

Female. Carapace length/width 1.41–1.51; MOA length/width 0.88–1.03 anterior width/posterior width 1.25–1.65. Chelicera with 4 promarginal and 3–4 retromarginal teeth. Labium length/width 0.63–0.81; sternum length/width 1.14–1.21. Length of leg 1/carapace 3.14–3.45. Abdomen length/width 2.33–3.19, with a pair of small lateral tubercles at about 1/4 to 1/3 from the posterior end (often indistinct) (Figs. 232–234). Female genitalia (Figs. 238–241): scape of epigynum slender, wrinkled (Figs. 238–239); internal genitalia as shown in Fig. 241.

Male. Carapace length/width 1.40–1.48; MOA length/width 0.80–0.95, anterior width/posterior width 1.56–1.92. Chelicera with 3–4 promarginal and 2–4 retromarginal teeth. Labium length/width 0.59–0.75; sternum length/width 1.15–1.38. Length of leg 1/carapace 2.99–3.24; retrolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 242–246): median apophysis distally bent and bifurcated (bifurcation sometimes indistinct) (Figs. 242–243), basally with a round lamella (Fig. 245); embolus spiniform (Fig. 245); paramedian apophysis visible in prolateral view (Fig. 245); cymbium caudally projecting (Fig. 244). Abdomen length/width 1.48–2.00, oval (Figs. 235–237).

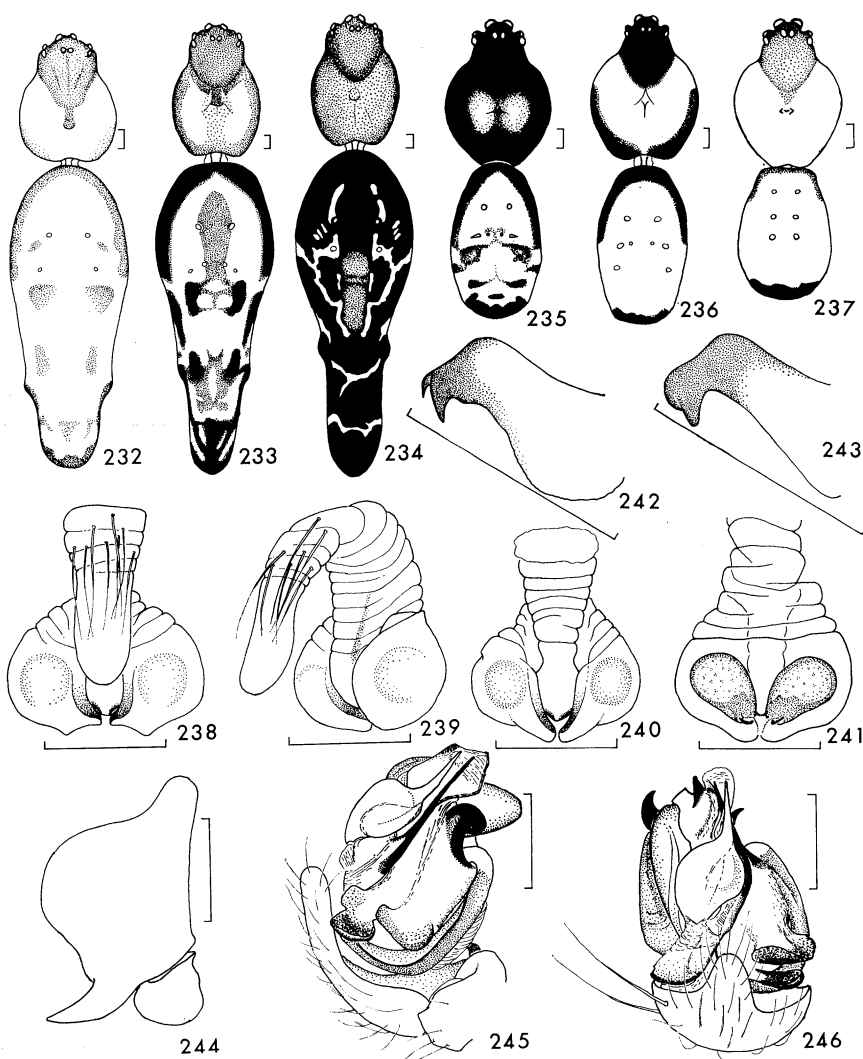
Coloration and markings. Female. Much varied. Carapace: pale brown, head region darker (Fig. 232); pale brown, head region darker, cephalic region marginated with dark brown (Fig. 233); or uniformly dark brown (Fig. 234). Abdomen: silver, with black markings (Fig. 232); silver, with black and dark brown markings (Fig. 233); or black, with complicated silver bands (Fig. 234).

Male. Carapace brown, head region black (Fig. 237), cephalic region often marginated with black (Fig. 236), sometimes median part also black (Fig. 235).

Abdomen silvery pale brown, both anterior and posterior ends black (Figs. 236–237), sometimes with some more black markings (Fig. 235).

Range. Japan, China, Korea, Taiwan.

Remarks. This species resembles *C. argenteoalba* BÖSENBERG et STRAND,



Figs. 232–246. *Cyclosa ginnaga* YAGINUMA, 1959. — 232–234. Cephalothorax and abdomen of female, dorsal view. 235–237. Cephalothorax and abdomen of male, dorsal view. 238–239. Epigynum with scape. 240. Same, without scape. 241. Female genitalia, dorsal view. 242–243. Median apophysis of male palp (distal part). 244. Male palpal cymbium, dorsal view. 245. Male palp, prolateral view. 246. Same, axial view. (Scales: 0.25 mm.)

1906, *C. okumae* sp. nov. and *C. kumadai* sp. nov. As for the discrimination, see the remarks of them.

***Cyclosa kumadai* sp. nov.**

[Japanese name: Kumada-ginnaga-gomigumo]

(Figs. 247–257)

Cyclosa ginnaga : CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 86, 220, fig. 75. [nec *C. ginnaga* YAGINUMA, 1959].

Specimens examined. Type series. Holotype: ♀, Mt. Mitakesan, Ōme-shi, Tokyo, 14–VI–1990, K. KUMADA leg. (NSMT–Ar 2437). Allotype: ♂, same data as for the holotype (NSMT–Ar 2438). Paratypes: 3♂♂, Nanshōnomori, Wakkanai-shi, Hokkaido, 11–VII–1990, K. KUMADA leg. (NSMT–Ar 2439); 1♀1♂, Tokura, Katashina-mura, Gunma Pref., 3–VII–1982, A. TANIKAWA leg. (NSMT–Ar 2440); 1♀, Minenoyakushi, Tsukui-gun, Kanagawa Pref., 3–VI–1990, A. TANIKAWA leg. (NSMT–Ar 2441); 1♀, Fudakake, Tanzawa, Kanagawa Pref., 17–VI–1990, A. TANIKAWA leg. (NSMT–Ar 2442); 1♀, Hakone, Ashigara-shimo-gun, Kanagawa Pref., 9–VII–1984, N. TANAKA leg. (NSMT–Ar 2443); 1♀, Kawaguchiko, Minamitsuru-gun, Yamanashi Pref., A. TANIKAWA leg. (NSMT–Ar 2444).

Other specimens examined. 1♀, Rishiritō Island, Rishiri-gun, Hokkaido, 12–VIII–1987, N. TANAKA leg.; 2♀♀, same locality, 13–VII–1990, K. KUMADA leg.; 1♀, Nansyōnomori, Wakkanai-shi, Hokkaido, 11–VII–1990, K. KUMADA leg.; 2♀♀, Wakkasakanai, Teshio-gun, Hokkaido, 15–VII–1990, K. KUMADA leg.; 6♀♀, Nakatonbetsu, Esashi-gun, Hokkaido, 17–VII–1990, K. KUMADA leg.; 1♀, Syari-chō, Syari-gun, Hokkaido, 18~25–VI–1989, H. TAKEICHI leg.; 1♀, Yamabe, Furano-shi, Hokkaido, 28–VII–1985, TANIKAWA leg.; 1♀, Nukabira, Katō-gun, Hokkaido, 21–VIII–1987, N. TANAKA leg.; 1♀, Kanayamako, Sorachi-gun, Hokkaido, 30–VII–1985, A. TANIKAWA leg.; 1♀, Kamishihoro-chō, Katō-gun, Hokkaido, 14–VII–1991, M. MATSUDA leg.; 1♀, Fūrenko, Nemuro-shi, Hokkaido, 17–VIII–1986, A. TANIKAWA leg.; 1♀, Goshikinuma, Maya-gun, Fukushima Pref., 29–VII–1991, K. KUMADA leg.; 4♀♀, Mt. Yuhiravama, Mavagun, Fukushima Pref., 28–VII–1991, K. KUMADA leg.; 1♀, Tokura, Katashina-mura, Gunma Pref., 3–VII–1981, A. TANIKAWA leg.; 1♀, 3–VIII–1985, 5♀♀, 6–VIII–1985, same locality, Y. HORI leg.; 15♀♀, 14–VI–1990, same locality and collector as for the holotype; 3♀♀, Okutama, Nishitama-gun, Tokyo, 25–V–1980, A. TANIKAWA leg.; 1♀, Fudakake, Tanzawa, Kanagawa Pref., 27–VIII–1972, K. KUMADA leg.; 31♀♀, 17–VI–1990, 7♀♀, 7–VI–1991, same locality, A. TANIKAWA leg.; 1♀, Shisseikaen, Hakone, Kanagawa Pref., 28–VI–1987, A. TANIKAWA leg.; 1♀, Sugadaira, Chûsagata-gun, Nagano Pref., 28–VII–1980, A. TANIKAWA leg.; 1♀, Karuizawa, Nagano Pref., VIII–1970, H. ONO leg.; 1♀, Komanoyu, Kiso-gun, Nagano Pref., 22–VIII–1968, H. TANAKA leg.; 11♀♀, Ōsugi-dani, Taki-gun, Mie Pref., 12~14–VI–1971, H. TANAKA leg.; 1♀, Mt. Hira Bunagatake, Siga Pref., 4–VIII–1954, T. YAGINUMA leg. (NSMT–Ar 240, labeled *C. ginnaga*); 2♀♀1♂, Haino, Kitakuwata-gun, Kyoto Pref., 8–VI–1969,

H. TANAKA leg.; 1♀, Ashiu, Kitakuwata-gun, Kyoto Pref., 9-VI-1969, H. TANAKA leg.; 1♀, Hirogawara, Kyoto-shi, Kyoto Pref., 29-VIII-1969, H. TANAKA leg.; 6♀ 1♂, Mt. Tachibanayama, Fukuoka-shi, Fukuoka Pref., VIII-1953, C. OKUMA leg.; 9♀ 1♂, 3~8-VIII-1951, 1♀, 3-VIII-1963, Mt. Hikosan, Tagawa-gun, Fukuoka Pref., C. OKUMA leg.; 4♀ 1♂, Mt. Sobosan, Taketa-shi, Oita Pref., 21~26-VII-1964, C. OKUMA leg.

Description. Measurement (in mm). Body length ♀ 4.60–8.15, ♂ 3.36–3.76; carapace length ♀ 1.66–2.06, ♂ 1.55–1.80, width ♀ 1.33–1.56, ♂ 1.10–1.29; abdomen length ♀ 2.18–6.00, ♂ 1.86–2.12, width ♀ 1.50–2.67, ♂ 1.06–1.32. Length of legs of the holotype ♀ and the allotype ♂ as shown in Table 21.

Table 21. Measurement of leg segments of *Cyclosa kumadai* sp. nov. (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.67/0.57	1.38/1.27	1.52/1.37	0.83/0.60	2.07/1.76	6.47/5.57
II	0.64/0.53	1.23/1.03	1.29/1.00	0.78/0.55	1.82/1.46	5.76/4.57
III	0.51/0.41	0.77/0.63	0.74/0.67	0.56/0.38	1.27/1.05	3.85/3.14
IV	0.57/0.49	1.27/1.05	1.32/1.08	0.70/0.46	1.89/1.48	5.75/4.56

Female. Carapace length/width 1.25–1.37; MOA length/width 0.91–0.98, anterior width/posterior width 1.28–1.48. Chelicera with 4 promarginal and 3–4 retromarginal teeth. Labium length/width 0.61–0.73; sternum length/width 1.09–1.15. Length of leg 1/carapace 3.26–3.62. Abdomen length/width 1.46–2.40. Female genitalia (Figs. 250–253): scape of epigynum double structured, wrinkled (Figs. 250–251); internal genitalia as shown in Fig. 253.

Male. Carapace length/width 1.39–1.43; MOA length/width 0.85–0.95, anterior width/posterior width 1.46–1.60. Chelicera with 3–4 promarginal and 4 retromarginal teeth. Labium length/width 0.53–0.75; sternum length/width 1.17–1.26. Length of leg 1/carapace 3.25–3.60; prolateral side of 1st femur distally with a row of short spines. Male palp (Figs. 254–256): median apophysis distally bifurcated (Fig. 254), basally with a tooth and a lamella (Fig. 255); embolus spiniform (Fig. 255); paramedian apophysis invisible in prolateral view (Fig. 255). Abdomen length/width 1.61–1.75.

Coloration and markings. *Female.* Carapace dark brown, both sides of median fovea paler (Figs. 247–248). Abdomen silver, with black markings (Figs. 247–248).

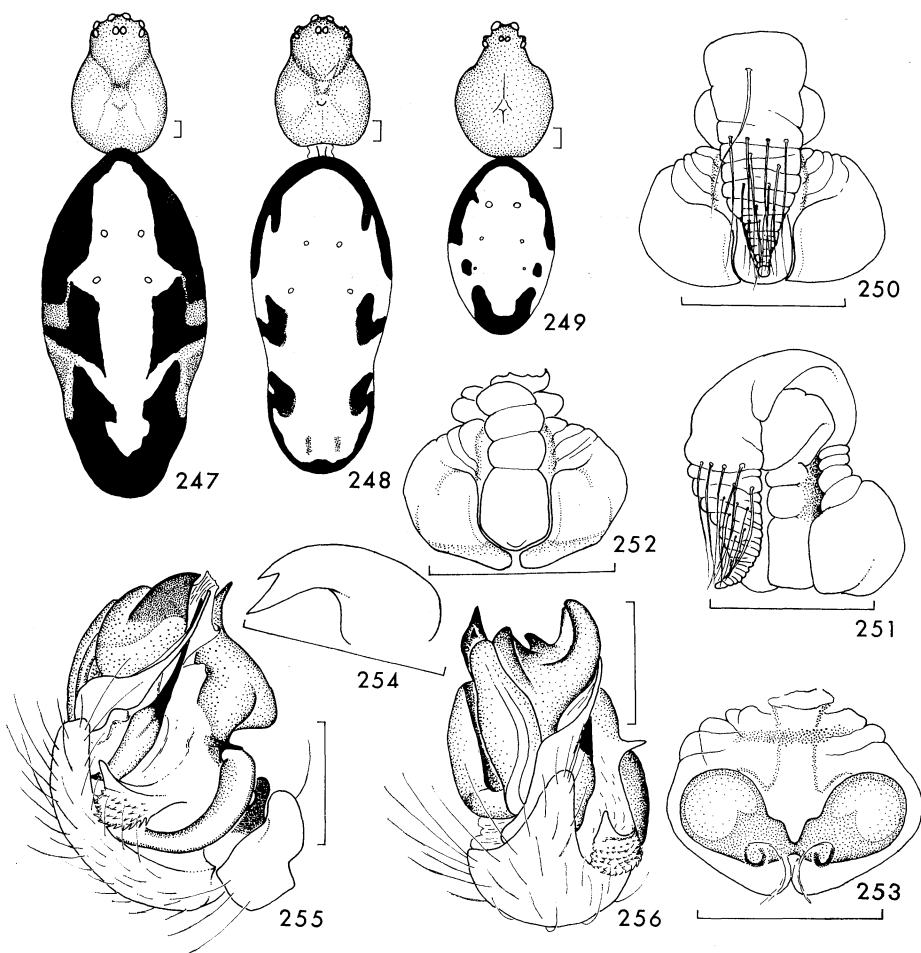
Male. Carapace dark brown. Abdomen silver or pale brown, with black markings (Fig. 249).

Range. Japan.

Remarks. This species closely resembles *C. ginnaga* YAGINUMA, 1959, but can be distinguished from the latter by the following points. *Female:* scape of epigynum is double structured (Figs. 250–251), but that of *C. ginnaga* is single (Figs. 238–239); even in the case of without scape, the shape of epigynum is also different (Figs. 240, 252). *Male:* distal part of palpal median apophysis is slightly curved and bifurcated (Fig. 254), basal part of it is provided with a tooth (Fig. 255); but in *C. ginnaga*, it is distally bent and bifurcation sometimes indistinct (Figs. 242–243), and is basally without a tooth (Fig. 245). shape of

basal lamella is also different (Figs. 245, 255); paramedian apophysis is invisible in prolateral view (Fig. 255), but it is visible in *C. ginnaga* (Fig. 245). This species also resembles *C. argenteoalba* BÖSENBERG et STRAND, 1906, and *C. okumae* sp. nov. As for the discrimination, see the remarks of the latters.

Etymology. Named after Mr. Ken-ichi KUMADA, Yokohama.



Figs. 247–256. *Cyclosa kumadai* sp. nov. — 247–248. Cephalothorax and abdomen of female, dorsal view. 249. Cephalothorax and abdomen of male, dorsal view. 250–251. Epigynum with scape. 252. Same, without scape. 253. Female genitalia, dorsal view. 254. Median apophysis of male palp (distal part). 255. Male palp, prolateral view. 256. Same, axial view. (Scales: 0.25 mm.)

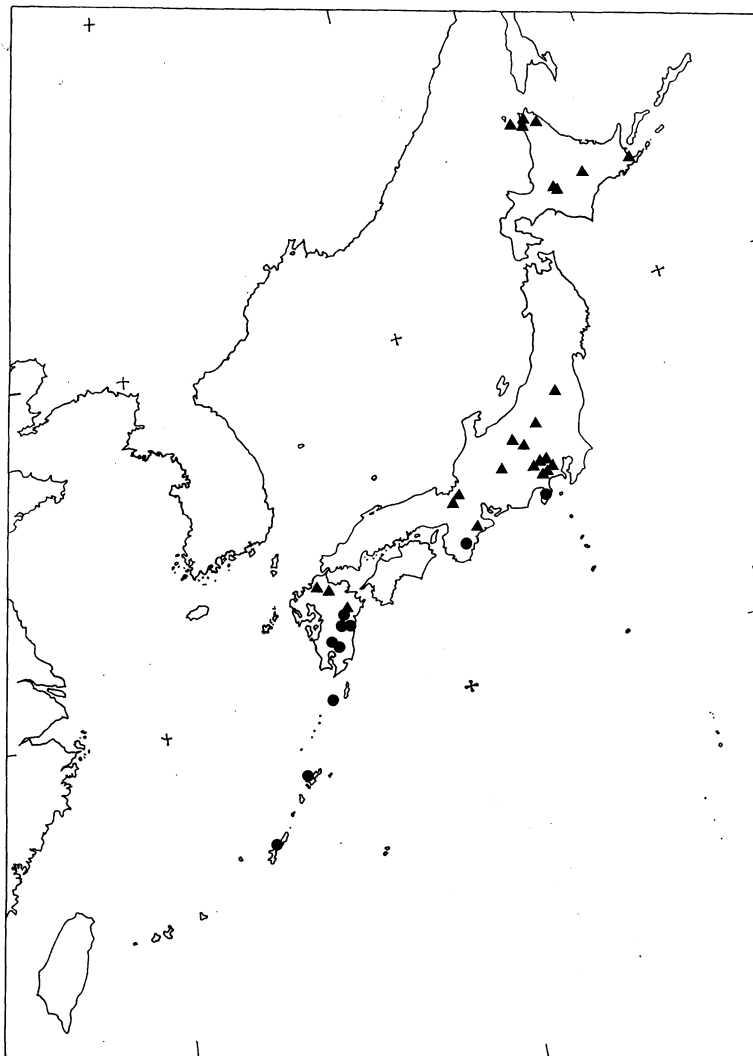


Fig. 257. Distribution of *Cyclosa ginnaga* YAGINUMA, 1959, and *Cyclosa kumadai* sp. nov. in Japan, based on the specimens examined in this study. ●: *C. ginnaga*; ▲: *C. kumadai*.

***Cyclosa sedeculata* KARSCH, 1879**

[Japanese name: Yotsude-gomigumo]

(Figs. 258–265)

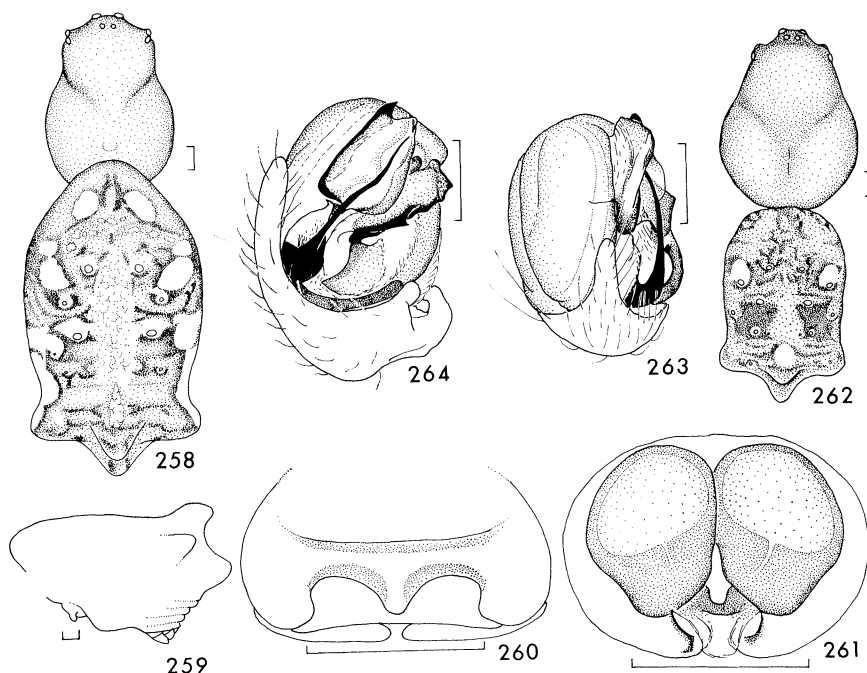
Cyclosa sedeculata KARSCH, 1879, Verh. naturf. Ver. preuss. Rheinl. Westfalens, **36**: 74, pl. 1, fig. 9. — BÖSENBERG & STRAND, 1906, Abh. senkenb. naturf. Ges., **30**: 207, pl. 15,

fig. 416. — SAITO, 1939, Saito-Ho-on Kai Mus. Bull., 18: 13, fig. 2. — ROEWER, 1942, Kat. Aran., 1: 753. — BONNET, 1956, Bibl. Aran., 2: 1322. — YAGINUMA, 1968, Spid. Japan Col. (rev. enl. ed.), p. 67, pl. 30, fig. 168; 1970, Bull. natn. Sci. Mus., Tokyo, 13: 659; 1977, Acta arachnol., 27 (spec. no.): 387; 1986, Spid. Japan Col. (n. ed.), p. 119, fig. 63, pl. 33, fig. 2. — ZHU, 1983, J. Bethune med. Univ., 9 (spec. no.): 30. — PAIK & KIM, 1985, Korean Arachnol., 1: 63. — PLATNICK, 1989, Adv. Spid. Taxon., p. 334. — CHIKUNI, 1989, Pictor. Encycl. Spid. Japan, pp. 85, 218, fig. 70. — KIM, 1991, Korean Arachnol., 6: 282.

Specimens examined. 1♀, Rifu-chô Kenmin-no-mori, Miyagi-gun, Miyagi Pref., 30-V-1981, K. SASAKI leg. (NSMT-Ar 496); 1♂, Dainohara-shinrinkôen, Sendai-shi, Miyagi Pref., 16-VI-1983, K. SASAKI leg.; 2♀♀, Mt. Takiyama, Utsunomiya-shi, Tochigi Pref., 14-VIII-1990, A. TANIKAWA leg.; 1♀, Utsunomiya-shinrinkôen, Utsunomiya-shi, Tochigi Pref., 12-VIII-1990, A. TANIKAWA leg.; 2♀♀, Univ. of Tsukuba, Tsukuba-shi, Ibaragi Pref., 30-V-1976, A. TANIKAWA leg.; 1♂, Chichibu, Saitama Pref., 19-VI-1985, A. TANIKAWA leg.; 5♀♀1♂, Kinchakuden, Hidaka-chô, Saitama Pref., 19-V-1991, A. TANIKAWA leg.; 4♀♀2♂♂, Hachiôji-jôshi, Hachiôji-shi, Tokyo, 21-V-1989, A. TANIKAWA leg. (2♂♂: NSMT-Ar 2446); 1♀1♂, 22-V-1988 (NSMT-Ar 2447), 3♀♀, 10-VI-1990, Nozuda, Machida-shi, Tokyo, A. TANIKAWA leg.; 1♀, Inohara, Chiba-shi, Chiba Pref., 16-VI-1984, T. KAWANA leg. (NSMT-Ar 839); 7♀♀, Minenoyakushi, Tsukui-gun, Kanagawa Pref., 3-VI-1990, A. TANIKAWA leg.; 1♀, 10-IX-1989, 3♀♀, 13-V-1990, 1♀, 8-VII-1990, 2♀♀1♂, 26-V-1991, Mt. Tsukui-shiroyama, Tsukui-gun, Kanagawa Pref., A. TANIKAWA leg.; 1♀, 26-V-1984, 1♂, 31-V-1986 (NSMT-Ar 2450), Maioka-chô, Yokohama-shi, Kanagawa Pref., A. TANIKAWA leg.; 2♀♀, 25-VI-1979, 1♀, 26-VI-1980, 1♀, 28-VI-1980, 1♀, 19-VII-1980 (NSMT-Ar 2448), 2♀♀1♂, 28-V-1990 (1♀1♂: NSMT-Ar 2449), Noba-chô, Yokohama-shi, Kanagawa Pref., A. TANIKAWA leg.; 2♀♀, Mt. Genjiyama, Kamakura-shi, Kanagawa Pref., 2-V-1991, A. TANIKAWA leg.; 5♀♀, Jinmuji, Zushi-shi, Kanagawa Pref., 20-V-1990, A. TANIKAWA leg.; 1♀, Mt. Kôbôyama, Hatano-shi, Kanagawa Pref., 15-IX-1989, A. TANIKAWA leg.; 2♀♀1♂, Iyama, Atsugi-shi, Kanagawa Pref., 27-V-1990, A. TANIKAWA leg. (NSMT-Ar 2451); 2♀♀, Fudakake, Tanzawa, Kanagawa Pref., 17-VI-1990, A. TANIKAWA leg.; 1♂, Kamiôi, Ashigarakami-gun, Kanagawa Pref., 1-V-1991, K. KUMADA leg.; 20♀♀, Mt. Daiyûzan, Minamiashigara-shi, Kanagawa Pref., 26-V-1990, A. TANIKAWA leg. (5♀♀: NSMT-Ar 2452); 1♀, Susado, Minamiazumi-gun, Nagano Pref., 7-VIII-1990, A. TANIKAWA leg.; 3♀♀, Ôsugidani, Taki-gun, Mie Pref., 12~14-VI-1971, H. TANAKA leg.; 1♀, Kiwa-chô, Minamimuro-gun, Mie Pref., 30-VIII-1990, A. TANIKAWA leg.; 15♀♀, Haino, Kitakuwata-gun, Koyto Pref., 8-VI-1969, H. TANAKA leg.; 3♀♀, Ashiu, Kitakuwata-gun, Kyoto Pref., 9-VI-1969, H. TANAKA leg.; 1♀, Sasari, Kitakuwata-gun, Kyoto Pref., 10-V-1969, H. TANAKA leg.; 1♀, 10-VI-1969, 2♀♀, 29-VIII-1969, Hirogawara, Kyoto-shi, Kyoto Pref., H. TANAKA leg.; 1♂, Kurama, Kyoto-shi, Kyoto Pref., 23-V-1968, H. TANAKA leg.; 1♀, Kibune, Kyoto-shi, Kyoto Pref., 20-IX-1969, H. TANAKA leg.; 1♀3♂♂, Kitayama, Kyoto-shi, Kyoto Pref., 15-V-1969, H. TANAKA leg.; 1♀, Yoshino, Yoshino-gun, Nara Pref., 4-VIII-1984, H. TANAKA leg.; 1♀, Hasedera, Sakurai-shi, Nara Pref., 21-V-1967, H. TANAKA leg.; 1♀, Amami, Kawachinagano-shi, Osaka Pref., 27-V-1969, H. TANAKA leg.; 2♀♀, Segawa, Minô-shi, Osaka Pref., 10-V-1977, T. KAMURA

leg.; 3 ♀♀, Mt. Kôyasan, Ito-gun, Wakayama Pref., 10–VIII–1969, H. TANAKA leg.; 1 ♀, Nachikatsuura-chô, Higashimuro-gun, Wakayama Pref., 2–VIII–1991, A. TANIKAWA leg.; 3 ♀♀, Mt. Ôginoyama, Mikata-gun, Hyogo Pref., 22–VI–1972, H. TANAKA leg.; 1 ♀, Tannan-chô, Taki-gun, Hyogo Pref., 6–VIII–1968, H. TANAKA leg.; 1 ♀, Ôji, Kôbe-shi, Hyogo Pref., 31–VII–1966, H. TANAKA leg.; 1 ♀, Kiyomizu-chô, Yasugi-shi, Shimane Pref., 2–IX–1991, K. KUMADA leg.; 4 ♀♀ 2 ♂♂, Omogo, Kamiukena-gun, Ehime Pref., 21–23–V–1967, C. OKUMA leg.; 6 ♀♀, 26–V–1970, 3 ♂♂, 28–V–1970, same locality, H. TANAKA leg.; 1 ♀, Mt. Tachibanayama, Fukuoka-shi, Fukuoka Pref., 24–VIII–1991, A. TANIKAWA leg.; 16 ♀♀ 15 ♂♂, Mt. Kôrasan, Kurume-shi, Fukuoka Pref., 2–V–1954, C. OKUMA leg.; 11 ♀♀ 5 ♂♂, 3–8–VIII–1951, 14 ♀♀ 3 ♂♂, 5–9–VI–1958, Mt. Hikosan, Tagawa-gun, Fukuoka Pref., C. OKUMA leg.; 3 ♀♀, same locality, 20–24–V–1971, H. TANAKA leg.; 2 ♀♀, Ishigôchi, Koyu-gun, Miyazaki Pref., 22–VII–1960, C. OKUMA leg.; 1 ♀, Nabetani, Miyakonojô-shi, Miyazaki Pref., 19–VII–1962, C. OKUMA leg.; 1 ♀, Shîba, Higashiusuki-gun, Miyazaki Pref., 6–7–VIII–1961, C. OKUMA leg.; 10 ♀♀ 2 ♂♂, Mt. Kirishimayama, Aira-gun, Kagoshima Pref., 27–V–1971, H. TANAKA leg.

Description. Measurement (in mm). Body length ♀ 3.90–6.00 ♂ 3.38–4.10; carapace length ♀ 1.67–2.04, ♂ 1.69–1.91, width ♀ 1.13–1.38, ♂ 1.32–



Figs. 258–264. *Cyclosa sedeculata* KARSCH, 1879. — 258. Cephalothorax and abdomen of female, dorsal view. 259. Female abdomen lateral view. 260. Epigynum. 261. Female genitalia, dorsal view. 262. Cephalothorax and abdomen of male, dorsal view. 263. Male palp, axial view. 264. Same, prolateral view. (Scales: 0.25 mm.)

1.52; abdomen length ♀ 2.30–4.10, ♂ 1.69–2.20, width ♀ 1.30–2.40, ♂ 1.05–1.44. Length of legs of 1♀1♂ from Kanagawa Pref. as shown in Table 22.

Female. Carapace length/width 1.36–1.48; MOA length/width 0.80–0.95, anterior width/posterior width 1.33–1.57; PME separated by more than one diameter (PME–PME/PME 1.00–1.50). Chelicera with 3–4 teeth on both margin. Labium length/width 0.58–0.70; sternum length/width 1.00–1.07. Length of leg 1/carapace 2.23–2.39. Abdomen length/width 1.60–1.77, posteriorly with four protuberances (Figs. 258–259). Female genitalia (Figs. 260–

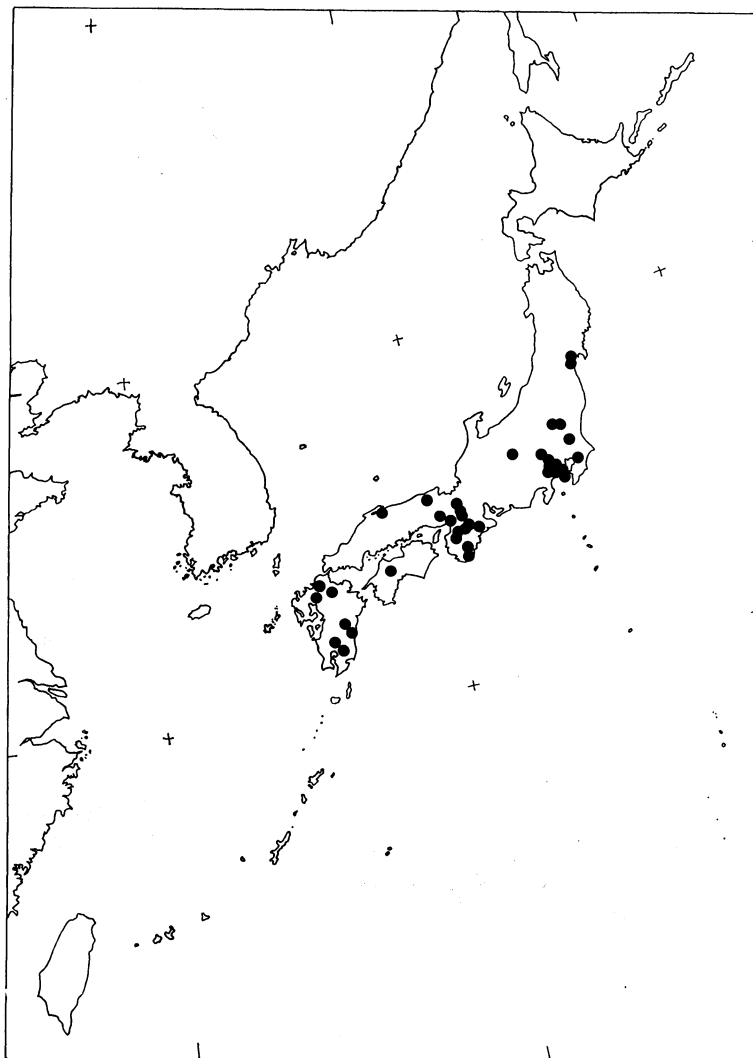


Fig. 265. Distribution of *Cyclosa sedeculata* KARSCH, 1879, in Japan, based on the specimens examined in this study.

Table 22. Measurement of leg segments of *Cyclosa sedeculata* KARSCH, 1879 (in mm; ♀/♂).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.56/0.50	0.97/0.88	0.86/0.85	0.61/0.53	1.30/1.21	4.30/3.97
II	0.50/0.45	0.84/0.72	0.73/0.72	0.59/0.51	1.15/1.09	3.81/3.49
III	0.44/0.37	0.55/0.49	0.53/0.52	0.45/0.38	0.90/0.87	2.87/2.63
IV	0.48/0.41	0.87/0.77	0.80/0.77	0.56/0.45	1.33/1.19	4.04/3.59

261): epigynum helmet-shaped (Fig. 260); internal genitalia as shown in Fig. 261.

Male. Carapace length/width 1.22–1.29, head region stout (Fig. 262); MOA length/width 0.81–0.94, anterior width/posterior width 1.38–1.64; PME separated by more than one diameter (PME–PME/PME 1.00–1.43). Chelicera with 3–4 teeth on both margin. Labium length/width 0.65–0.80, sternum length/width 1.02–1.10. Length of leg 1/carapace 2.19–2.35. Male palp (Figs. 263–264): embolus spiniform (Fig. 264); terminal apophysis short (Fig. 264); tegulum stout (Fig. 263); lacking paramedian apophysis. Abdomen length/width 1.42–1.61, posteriorly with four protuberances.

Coloration and markings. Female. Carapace dark brown. Abdomen pale brown, mottled with yellowish white and dark brown (Fig. 258).

Male. Carapace blackish brown. Abdomen similar to female (Fig. 262).

Range. Japan, China, Korea.

Remarks. This species is easily distinguished from the other Japanese species of the genus by the following points: PMEs are separated by more than one diameter; epigynum is helmet-shaped (Fig. 260); male head region is stout (Fig. 262); male palpal organ is also characteristic (Figs. 263–264).

Acknowledgments

I wish to express my hearty thanks to Dr. Hirotugu ONO, National Science Museum (Nat. Hist.), Tokyo (NSMT), for his constant guidance and reading the manuscript of this paper.

For loaning invaluable specimens, I am deeply indebted to Dr. Manfred GRASSHOFF, Senckenberg Museum, Frankfurt (SMF), Dr. Henrik ENGHOF and Dr. Nickolaj SHARFF, Zoologisk Museum, København (ZMK), Dr. Giuliano DORIA and Dr. L. CAPOCACCIA, Museo Civico di Storia Naturale, Genova (MCSN), Dr. Paul HILLYARD and Dr. F. R. WANLESS, British Museum of Natural History (BMNH), Dr. Valerie DAVIES and Dr. Robert J. RAVEN, Queensland Museum, South Brisbane (QM), Dr. Herbert W. LEVI, Museum of Comparative Zoology, Harvard University (MCZ), Dr. Christine ROLLARD, Muséum National d'Histoire Naturelle, Paris (MNHN), Dr. Gisela RACK, Zoologisches Museum, Universität Hamburg (ZMH), Dr. P. J. VAN HELSDINGEN, Rijksmuseum van Natuurlijke Historie, Leiden (RNHL), Dr. James P. O'CONNOR, National Museum of Ireland, Dublin (NMI) and Dr. Takahide KAMURA, Otemon Gakuin Univ., Osaka (OG).

My sincere thanks are also due to Mr. Yasunosuke CHIKUNI, Nagano, Mr.

Ken-ichi KUMADA, Yokohama, Ms. Sachiko TAZOE, Yokohama, Mr. Norihisa TANAKA, Yokohama, Mr. Akira SHINKAI, Tokyo, Dr. Chiyoko OKUMA, Kyushu University, Dr. Hozumi TANAKA, Sonoda Gakuen Women's College, Dr. Tadashi MIYASHITA, Tokyo University, Mr. Takehisa HIRAMATSU, Saitama, and Ms. Mayumi MATSUDA, Hokkaido, for their offering or loaning various specimens used in this study.

摘 要

ゴミグモ属のクモ類は日本から15種が記録されていたが、筆者は、日本各地から得られた多数の標本を検討した結果、22種の生息を確認した。従来、日本でシマゴミグモと呼ばれ、*C. insulana* (COSTA, 1834) に同定されてきたものには、2種が混同されていたことが判明した。この2種をヨーロッパ産の *C. insulana* の標本と照合した結果、いずれも別種であった。一方、原記載以来採集記録がなかった *C. confusa* BÖSENBERG et STRAND, 1906のタイプ標本を検討した結果、いままでシマゴミグモとされてきた2種のうち1種はこれに同定できた。もう1種は新種として記載した。また、ハマゴミグモについては、従来、*C. camelodes* (THORELL, 1878) に同定されてきたが、タイプ標本との照合により、別種であることが判明し、新種として記載した。さらに、*C. atrata* BÖSENBERG et STRAND, 1906 カラスゴミグモ、*C. argenteoalba* BÖSENBERG et STRAND, 1906 ギンメッキゴミグモ、*C. ginnaga* YAGINUMA, 1959 ギンナガゴミグモのそれぞれに混同されていたと思われる近似の別種など8種を新種として記載した。一方、S. SAITO (1939) によって青森県から記録された *C. conica* (PALLAS, 1772) コゴミグモについては、S. SAITO (1939) が同定した標本の保管場所が不明で検討できないことと、今回検討した多くの標本の中にそれと同定できるものが全く見いだせなかったことから、本論では扱わなかった。

本論で扱った22種の種名は次のとおりである。*C. octotuberculata* KARSCH, 1878 ゴミグモ、*C. laticauda* BÖSENBERG et STRAND, 1906 キジロゴミグモ、*C. monticola* BÖSENBERG et STRAND, 1906 ヤマゴミグモ、*C. angusta* sp. nov. ヤセゴミグモ (新称)、*C. onoi* sp. nov. オノゴミグモ (新称)、*C. omonaga* sp. nov. シマゴミグモ、*C. confusa* BÖSENBERG et STRAND, 1906 ミナミノシマゴミグモ (新称)、*C. japonica* BÖSENBERG et STRAND, 1906 ヤマトゴミグモ、*C. norihisai* sp. nov. オガサワラゴミグモ (新称)、*C. atrata* BÖSENBERG et STRAND, 1906 カラスゴミグモ、*C. hamulata* sp. nov. カギヅメカラスゴミグモ (新称)、*C. maritima* sp. nov. ハマゴミグモ、*C. psylla* (THORELL, 1892) ヒメマルゴミグモ、*C. mulmeinensis* (THORELL, 1887) トゲゴミグモ、*C. vallata* KEYSERLING, 1886 マルゴミグモ、*C. sachikoe* sp. nov. ミツカドゴミグモ (新称)、*C. alba* sp. nov. シロゴミグモ (新称)、*C. argenteoalba* BÖSENBERG et STRAND, 1906 ギンメッキゴミグモ、*C. okumae* sp. nov. オオクマギンメッキゴミグモ (新称)、*C. ginnaga* YAGINUMA, 1959 ギンナガゴミグモ、*C. kumadai* sp. nov. クマダギンナガゴミグモ (新称)、*C. sedeculata* BÖSENBERG et STRAND, 1906 ヨツデゴミグモ。

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